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Features

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Cover

A special thanks to Dr. Chandra Madramootoo of the Department of Agricultural Engineering here at Macdonald and to Julie Carroll of the Center for Engineering Design, the University of Utah, for providing a photograph of the "Utah/MIT Dextrous Hand" holding an apple. The hand was developed at the Center for Engineering Design at the University of Utah to study machine dexterity. It encompasses the latest technology in robotics and artificial intelligence; two silicon-based developments which will revolutionize the food and agricultural industries. Read more about these developments in Dr. Madramootoo's article on page 23; this is just one of the excellent articles bringing us up-to-date on the exciting developments in Agricultural Engineering here at Macdonald College. Special thanks also to Maurice Demers for his Guest Editorial which so appropriately sets the scene. Focus Environment is a new column which will appear in each issue. Dr. Roger Bider gets us off to a great start.

Guest Editorial

Agricultural Engineering in Quebec

by Maurice Demers
Engineer, Ministère de l'Agriculture, des Pêcheries et de l'Alimentation

The Ordre des Ingénieurs du Québec, which celebrated its centennial in 1987, links the history of Engineering to the great works of the Egyptians of 7000 B.C. Agri-food engineers feel comfortable with this historical connection since the great works of the time, and of the following centuries, consisted, for a large part, in drainage and irrigation, in devising agricultural machines, and in constructions to store and preserve agricultural products.

In Quebec, the first engineers were with the military from France and Great Britain. Next came the opening of the great schools of engineering, including McGill in 1857. It was mostly in the late 1940s during the post-war economic recovery, however, that the teaching of engineering really gained importance. At last, in the 1960s, Agricultural Engineering degree programs were offered at both Laval and McGill Universities. Until then Agricultural Engineering was only an option in the Agriculture courses, which did not give the graduates access to the engineering profession. Those interested in this field had to get a degree from Saskatoon or from a university in the United States.

Quebec agriculture made it through this period by borrowing machines and technologies from other areas, and the Ministry of Agriculture assisted the farmers as best it could on the most urgent of engineering problems with land drainage taking high priority.

Surface Drainage

The province of Quebec has only about 2.5 million acres of usable farm land and land drainage has been a major problem. Excess, or retention or loss of water has caused low productivity, even in regions most favoured by good soils and climate. The growth of Quebec agriculture owes a great deal to rational water management.

As far back as 1857, Joseph-Xavier Perrault, one of the first French-Canadian agronomists and agricultural reporters, used to preach land drainage, farm loans, cattle improvement, dairy industry, and agricultural education. In the matter of surface drainage, the Ministry of Agriculture has been intervening since 1917 with special grants for digging municipal watercourses. Parts of these watercourses often required manual work, and this particular policy was most popular during the depression.

Maurice Demers joined the engineering service of the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) in 1967 and remained with the tile drainage section for 10 years. He is now in charge of machine design and development projects in collaboration with the Quebec Industrial Research Centre and universities. He is also involved with material standards development and with terminology.

Maurice Demers is Vice-Chairman of the organizing committee of the joint 1989 convention of the American Society of Agricultural Engineers and the Canadian Society of Agricultural Engineers. He is Chairman-elect of the North Atlantic Region of ASAE, Secretary of the Agricultural Engineering Commission of the Quebec Crops Council, and President of the Quebec Agricultural Engineers Association.

The first drag line was bought by the Ministry of Agriculture in 1928. More machines were added in the following years with the result that the Ministry had 9 diggers in 1935, 27 in 1944, 37 in 1961, and 51 in 1965.

The advent of private enterprise in the field of land drainage came in 1944 and during the following 20 to 25 years drainage work went from 300 kilometres per year to 2,000. Today the Ministry only needs to examine existing watercourses for flow delays due to aging, natural causes, or human or animal intervention.

Subdrainage

Subdrainage in Quebec dates back to the beginning of the century and, according to the records, most of the plans that were drafted for a period of 25 to 30 years were under the supervision of Macdonald College. In 1912 the Ministry started a program under which the farmer received a grant for 50 per cent of the cost of draining. That same year the Ministry bought two drainage ploughs and put them at the disposal of the Schools of Agriculture at Oka and Sainte-Anne-de-la-Pocatière, which were commissioned to train technicians and to conduct subdrainage demonstrations. Schools of agriculture, research stations, and orchard owners, in general, took advantage of those drainage ploughs as did farmers in Pontiac, Huntingdon, and Chateauguay counties.

In 1925 five ploughs belonging to contractors and two ploughs from the Ministry were laying drain under the supervision of the Ministry's engineers. Tile laying was slowed down, though, by the cost of drainage and also by the shortage of tile and of manpower, and the lack of depth of the collecting ditches. All activities seemed to stop at the beginning of the 1930s in favour of surface drainage. Subsurface drainage resumed in 1942 but at a very slow tempo. From 1963, due to the reorganization of services following new laws passed by the Ministry in 1962, subdrainage came back to life and grew at a great rate, reaching almost 30,000,000 metres in 1979.

Continued on page 22

Agricultural Engineering at Macdonald

In 1910 a Manual Training program was instituted at Macdonald College of McGill University, to be renamed the Department of Agricultural Engineering and Manual Training in 1914 and, more simply, the Department of Agricultural Engineering in 1918. George Emberly was the first Lecturer in the program until 1921, assisted by Louise Wetmore for the first years, and by Mr. J.A. Starrak for subsequent years. Professor Louis Heimpel replaced George Emberly in 1921 and continued as Chairman of the Department for 30 years. During that period, the other instructional staff included Frank North (1923-30), Robert Millenchamp (1920-36), and James Cooper (1941-72). For more than a decade after his retirement, Professor Cooper continued to visit the departmental shop to provide expert consultation on the fabrication of teaching and research equipment.

In 1946 the Agricultural Engineering program was formed as an option in the BSc (Agriculture) degree. In that same year Professor A.C. Malloch joined the staff for a period of 15 years, bringing the staff complement to three, and the department moved to the newly completed Agricultural Engineering Building. Professor Heimpel retired in 1951 to be replaced by Angus Banting, who came to Macdonald from the Nova Scotia Agricultural College. Professor Banting remained Chairman until ill health forced his retirement in 1963. He hired Robert S. Broughton (specializing in soil and water management) from Ontario in 1961, and two years later John Ogilvie (structures and environment) also joined the staff. Eric Norris (power and machinery) arrived in 1965 under the Chairmanship of R.S. Broughton and, at that time, with an academic staff of four, the department developed a program for a new degree of BSc (AgrEng), designed to qualify for professional engineering accreditation in Canada. The first students graduated from this program in 1971.

Also in 1966, the first post-graduate student, Edwin Lake, was admitted in the department to finish his MSc two years later, and his graduation was followed by the awarding of the first PhD degree to Kudret Selcuk in 1969. Since then over 120 post-graduate degrees have been earned in the department, including Dr. Suzelle Barrington, the first Canadian woman Doctor of Philosophy in the discipline in 1985.

In 1969 Dr. Anwar Malyk (process engineering) joined the staff for a period of four years. At that time of developing academic programs, it was realized that doctorate degrees were very desirable for staff, yet very few then existed in Canada. Chairman Robert Broughton encouraged John Ogilvie and Eric Norris to take study leaves in the United States to pursue higher degrees, while he enrolled in a PhD program in the Department of Soil Science under the supervision of Dr. Benno P. Warkentin. Pierre Jutras (soil and water specialist) and Russ Halyk (power and machinery) joined the department during this period of staff leaves for two- and four-year terms, respectively.

The year 1971 marked the transfer of the Chairmanship to John Ogilvie for a period of six years and the participation of Dr. Edward McKyes (soil mechanics specialist) on a part-time basis. The latter held a joint appointment with the Department of Civil Engineering at McGill, an arrangement that was to last a further five years until he became full time at Macdonald. In the interim, James Cooper retired in 1972 when Alfred Marquis (environmental control) became a staff member for two years, and Dr. Robert Kok (food engineering and computer applications) was appointed in 1974. The staff then numbered five, at a time when plans were afoot to demolish the Agricultural Engineering Building in order to construct a new building for the faculty on that site. Thus, in 1976, the department offices were moved to Harrison House near the Lakeshore Road.

While residing in Harrison House, the department underwent substantial staff changes in 1977, with the move of John Ogilvie to the University of Guelph, the return of Pierre Jutras from industry, the addition of Dr. Vijaya Raghavan (post harvest technology), who was formerly a Research Associate, and the appointment of Dr. McKyes as Chairman. Another move, this time to the new Macdonald Stewart Building was made in 1978, after which the department was able to carry on business as usual. With the increase in enrollment at the BSc and post-graduate levels in the 1970s, approval was obtained for an additional Lecturer position in 1980, filled by Etienne Perraton for two years. Another staff increase came about in 1983, and Dr. Shiv O. Prasher (groundwater pollutant transfer) was appointed Assistant Professor, while Gilles Bolduc (drainage and structures) took over the post of University Lecturer, bringing the total academic staff to eight (including one equivalent position for teaching in the Diploma in Agriculture program). In 1984 Pierre Jutras began a two-year leave to develop an Agricultural Engineering program at Thies, Senegal, and was ably replaced by Lecturers Dr. Chandra Madramootoo and Miss Leta Fernandes.

In January of 1986 Pierre Jutras left the university and was replaced by Dr. Suzelle Barrington (nee Thauvette), B.Sc. (Agr Eng)'73, as Assistant Professor specializing in agricultural structures and environment. In addition in June of 1986, Dr. Chandra A. Madramootoo was appointed as Assistant Professor in the areas of hydrology and irrigation engineering. June 1987 saw the end of Ted McKyes' 10-year term as Chairman, and Dr. Eric Norris took over the post.

The class size in the Agricultural Engineering program did not change a great deal over the first 30 years of the existence of the option, averaging approximately eight from 1946 to 1976. Thereafter it grew continually to 37 in 1988. In that year McGill graduated about 35 per cent of the new Agricultural Engineers in Canada, together with the majority of post-graduate students. In fact, the department graduated 10 MSc and PhD students in June of 1985 alone, more than the usual number of undergraduates 10 years ago. By 1988, there were 55 registered post-graduate students at the MSc and PhD levels.

Editor's Note: This history has been compiled over the years by a series of departmental chairmen, beginning with Robert S. Broughton. The most recent revisions were performed by Ted McKyes and Eric Norris.

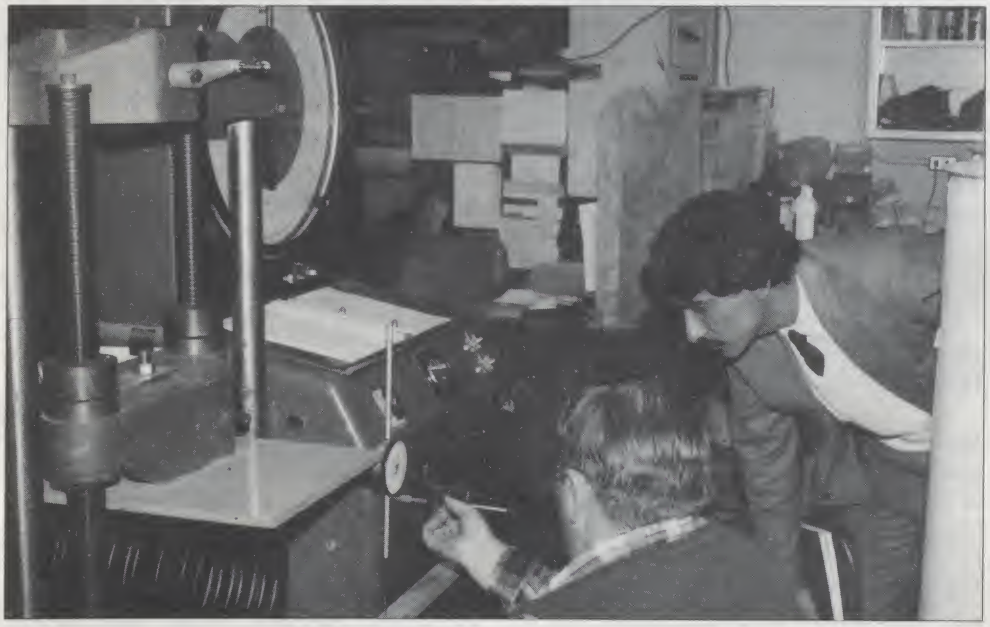
Centre for Drainage Studies

A Centre for Drainage Studies was officially established at Macdonald College in May 1987. The Centre is part of the Faculty of Agriculture and the Faculty of Graduate Studies and Research of McGill University. Professor Robert S. Broughton is the Centre's Director and Professor Edward McKyes is Associate Director.

Other directly involved staff are: Gilles Bolduc, Bob Bonnell, Robert Kok, Chandra Madramootoo, John Mayo, Shiv Prasher and Vijaya Raghavan from the Department of Agricultural Engineering; A.F. MacKenzie and Guy Mehuys of the Department of Renewable Resources, Dr. Van Nguyen of the Department of Civil Engineering, and Dr. Alan Woodbury of the Department of Geological Sciences.

Participants at the 1987 International Land Drainage Course held at Macdonald College.

Research and education concerning drainage problems that have been carried out in the Departments of Agricultural Engineering and Renewable Resources for many years is continuing at the Centre. The Centre is also continuing to offer postgraduate and professional courses on topics relating to drainage, irrigation, soil and water conservation, and land improvement both at Macdonald and at overseas locations. Countries in which staff members have assisted with drainage and soil and water management to date include: Barbados, Egypt, El Salvador, Haiti, Mali, Nigeria, Pakistan, St. Lucia, and Trinidad and Tobago.



Observing tube testing equipment and procedures at Macdonald College.

Work that will continue through the Centre will include small and large project investigations, field and laboratory research work, and short courses both here and abroad.

The International Land Drainage Course, which was first held in 1976, was given May 4 - June 4, 1987, by the Centre. This course, which is given at Macdonald College and at the Lethbridge Community College with assistance from the Canadian International Development Agency (CIDA), every two years, has attracted students from Quebec, other Canadian provinces, the United States, and such countries as Eqypt, India, Nigeria, Pakistan, the Philippines, St. Lucia, Sierra Leone, and Trinidad and Tobago. The field study trips, which form an important part of this course, give participants a unique opportunity to see some interesting parts of rural Canada.

We are fortunate to have had the assistance of Brent Paterson and his staff from the Drainage Branch, Irrigation and Conservation Division of Alberta Agriculture for the Alberta part of the course which includes drainage work to intercept seepage from

canals and prevent salinization and waterlogging of irrigated lands.

The primary objective of the Drainage Course is to help participants increase their skill, knowledge, and competence for planning, design, construction research, operation, and maintenance of drainage and irrigation systems to increase food production. More than 200 people participated in various parts of the 1987 course and 12 countries were represented among students and staff. The 53 student participants included 14 engineers from Egypt, seven from Pakistan, 22 postgraduate and senior undergraduate students from Macdonald, 10 engineers and agrologists from provincial government agencies in Saskatchewan, Alberta, Ontario, and Quebec, and five people from consulting firms. Staff participation totalled 25 persons and another 52 people contributed information at farms, drainage material production factories, soil exploration sites, research laboratories, and so on.

While in eastern Canada, the course covered basic drainage theory, observations of land suffering from waterlogging due to rainfall and snowmelt, land improved by drainage work, field investigational techniques, laboratory work, drain tube fabrication, drainage construction, pumping stations, and visits to consulting firms. "Hands on" experience in applications of microcomputers to drain system design and analysis was also gained.

Long before the Centre was established, off-campus research in drainage problems in Quebec took high priority in the Department of Agricultural Engineering, and the Centre is continuing that commitment. As one example, the results of the research for the past three years on the combined subsurface irrigation and drainage on the production of maize grain on the sandy soils in Richelieu County have been very encouraging with yield increases due to irrigation ranging from 18 per cent in 1985 to 45 per cent in 1987. There are 10,200 hectares of sandy soils in Richelieu County and in St-Hyacinthe County north of Highway 20 and between the Richelieu and Yamaska Rivers which are suitable for subsurface irrigation.

Since a soybean micronization plant has been built at St-Robert de Richelieu, and as we are currently importing 135,000 tonnes or 80 per cent of the soybean meal used in Quebec, there is real interest in growing soybeans with subsurface irrigation in this area.

Professor Broughton said recently that the Centre's students and staff are quite excited about continuing the research and educational aspects that have already been well established here at Macdonald College.

Noting the installation and observing the operation of submersible drainage pumps at Roda Farm, Saint-Anicet, Quebec.

Professor Broughton shows Pakistani trainees how to take soil cores for bulk density and soil permeability measurements.

Improving Soil and Water Quality

by Professors Chandra Madramootoo and Shiv Prasher
Department of Agricultural Engineering

It is estimated that in the province of Quebec nearly 0.2 million hectares of cropland are affected by soil erosion due to water. Soil erosion has deleterious effects not only on crop productivity, but also on our land and water resources. Topsoil and organic matter are being eroded at an alarming rate, thereby reducing the land resource base. Eroded sediment is deposited in rivers, lakes, and streams. Soil particles, which are detached by rainfall, runoff, and wind, act as pollutant transport mechanisms. Receiving water bodies therefore become contaminated with fertilizers and pesticides. This has a negative impact on water resources in terms of damage to drinking and recreational water supplies and to aquatic life. A study in Quebec has shown that nearly $10 million are being wasted annually on the loss of agrichemicals through erosion. The cost due to environmental damage could be even more severe.

Drastic erosion on a steep ditch bank in southwestern Quebec.

Senator Herbert Sparrow in his book "The Soil at Risk" states quite clearly that our food security and ability to be a major food producer and supplier will be threatened unless we immediately tackle the problems of soil degradation, in particular soil erosion.

Our research at Macdonald College is directed towards the identification of erosion prone farmlands in Quebec and recommendation of best management practices (BMPs). In order to identify erosive areas and make recommendations it is necessary to estimate soil and agrichemical losses from farmlands and watersheds. Over the past two years we have been making measurements of such losses on some watersheds in southern Quebec as well as from fields of coarse textured soils at St. Leonard d'Aston. This has allowed us to study some of the fundamental aspects of hydrology and sediment detachment and transport. We have also been able to observe the effects of rainfall, runoff, season, land-use, and crop type on sedimentation and fertilizer loss.

Since it is impossible to make measurements at a great many places, computer simulation models are useful for the prediction of sedimentation and chemical losses. We are currently evaluating several hydrologic models and refining them for local conditions. These models also have the capability of identifying areas of excessive soil loss and of assessing the benefits of various conservation practices. The data collected from our field experiments are used for model testing and validation.

Sediment models generally operate on a cell or grid basis and require tremendous inputs of data. We are therefore using the new technology of Geographic Information Systems (GIS) to generate and store spatial data bases. The McGill Weather Radar, located on the Macdonald campus, provides us with remotely sensed rainfall measurements over each cell, for model simulations.

Some of our research is aimed at evaluating various soil conservation practices. For example, in conjunction with the Union des Producteurs Agricole (UPA), four different widths of grass buffer strips adjacent to watercourses are being evaluated on farms in southern Quebec. Farmers often cultivate too close to watercourses. The seeding of buffer strips could significantly reduce soil and chemical losses as well as maintain ditch bank stability. Soil conservation on potato fields through improved surface and subsurface drainage is also being investigated. The use of field residue and stubble during the winter and early spring, crop rotations, contour farming, strip cropping, and tillage improvements are some of the recommendations from our studies.

Pesticides and Groundwater Contamination

The use of pesticides has become an integral component of modern farm management in Canada. It has played an important role in increasing and maintaining the current yields of crops. Pesticides are a group of chemically diverse control agents which are solely grouped on the basis of a common use. For the most part they are synthetic organic chemicals which are applied to a crop to mitigate losses resulting from noxious insects, weeds, and fungi. Control strategies are thus directed not at eradicating the target organisms but rather at reducing crop losses to economically acceptable levels.

The increased use of pesticides on farms, however, is fast becoming a controversial

issue. In 1983 about 30 million kg of pesticides were used in Canada. The agricultural sector accounted for 63 per cent of the total pesticide consumption. In Quebec and the Atlantic Provinces, a total of $87.7 million was spent on pest-control products in 1984-85.

Though these toxic chemicals are applied in small amounts on or above the soil surface, a fraction of them may show up in groundwater via leaching and in water courses via surface runoff, groundwater interflow, and subsurface drains. Such possibilities have made the general public very wary about the possible health risks posed by these chemicals, both in terms of direct exposure to them or by their presence in drinking water.

Research efforts are underway at Macdonald College to address this pollution problem. Research in this area has been funded by the following agencies: Natural Sciences and Engineering Research Council of Canada (NSERC), Research Contract Program in Soil and Water Conservation - Canada/Quebec Subsidiary Agreement on Agri-food Development, and Fonds pour la Formation de Chercheurs et l'Aide à la Recherche (FCAR).

A new pesticide-residue analysis laboratory has been established in the Department of Agricultural Engineering. We began to equip the laboratory with state-of-the-art equipment in 1988 and another sum of money will be expended this year to complete the task.

An extensive study has been underway since the summer of 1988 to investigate the pollution problem. Two field sites have been selected at the Macdonald College Farm to study the fate and transport of two pesticides - atrazine and metolachlor - in two different soil types, Ste-Rosalie clay and Ste-Sophie sand. Both sites are cropped with grain corn. The pesticides used in this study represent those commonly used with corn in the Ottawa-St. Lawrence lowlands. The investigation will include sampling of groundwater and soil samples at different time intervals after pesticide applications.

A low level crossing for watering cattle in eastern Ontario. This technique prevents erosion of the ditch banks.

The field study will generate data on the movement and fate of pesticides and their metabolites in the soil profile and groundwater which could be used to develop or verify simulation models for pesticide movement. These models will be used to develop Best Management Practices (BMPS) to control environmental pollution of surface water and groundwater resources.

Another component of this study deals with the investigation into the movement of pesticides under laboratory conditions. We will be using radio-labelled pesticides on long (120 cm long x 20 cm diameter) undisturbed soil cores. The results from the laboratory study will be used to fine tune simulation models for pesticide transport.

We believe that the use of pesticides on farms should continue in eastern Canada for economic reasons. However, we are confident that better management practices can be developed that could minimize both on-site and off-site pollution. We expect to make significant contributions to existing knowledge in this area.

Among the guests and dignitaries at the UPA Demonstration Day on Roger Quenneville's farm in St-Anicet were the federal Minister of State for Agriculture the Honourable Pierre Blais, Vice Principal (Macdonald College) Roger Buckland, and the Quebec Minister of Agriculture Michel Pagé. The project demonstrates the use of grass buffer strips along watercourses to reduce soil erosion and improve water quality.

Feb./89

Water Management Systems

by Professor Shiv Prasher
Department of Agricultural Engineering

There is a need for efficient management of water on farms in the Ottawa-St. Lawrence lowlands. There are alternate seasons of water deficits and water surpluses that make the job of managing water to meet crop water requirements a rather difficult one. Whereas there is an excess of precipitation in winter, early spring, and late fall, there are often water deficits during the summer months. In these months the water table is quite deep, especially in coarse-textured soils such as sands and sandy loams. The water table may recede by as much as 3 m or more into the soil during July and August. At such water table depths, it is almost impossible to meet crop water requirements without causing significant drought-related stresses in growing plants. Of course, such effects are more visible in coarse-textured soils than in fine-textured soils and also they are more evident in "dry" summers than in "wet" summers.

Since in humid regions yearly precipitation exceeds potential evapotranspiration, it is almost mandatory for any viable farming enterprise to install subsurface drainage systems. The primary job of such a system would be to ensure workable soil conditions during the growing season and the timely removal of excess water from the crop root zone in the case of a severe rain storm. However, it is becoming evident that some drainage systems are also increasing drought conditions in the crop root zone during July and August, especially in coarse-textured soils. Some sandy soils are being excessively drained by the subsurface drainage systems.

As a result of recent research efforts being conducted at Macdonald College and other places in North America, it is now possible to make efficient use of agricultural water with the help of water management systems. In the context of humid regions, a water management system might include a subsurface drainage and a subirrigation system or a controlled subsurface drainage system.

In a subirrigation system, water is pumped back into the existing subsurface drainage system and the existing drain laterals act as "buried" perforated irrigation pipes. The advantages of such a system are obvious: there is hardly any new additional infrastructure required. We may need to install some water table control chambers to properly irrigate the whole field. This should be viewed in comparison to the other irrigation option available to farmers, i.e., sprinkler irrigation systems. Sprinkler irrigation is expensive and only a handful of farmers would be able to afford it. On the other hand, subirrigation systems would require minimal extra capital and maintenance. In essence, most of the system costs were already paid when the subsurface drainage system was installed on the farm. By using the subsurface drainage system as an irrigation system, we are getting extra mileage from the money that was spent initially on the installation of the subsurface drainage system.

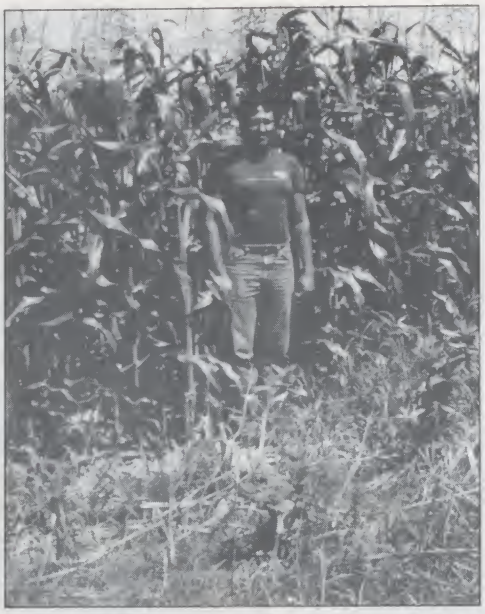


Photo 1. The benefits of subirrigation may be seen in this photo of MSc student Massoud Soultani being overshadowed by the corn.

In a controlled drainage system, the water table is maintained at a higher level in the field by using a water overflow structure at the drain outlet. The soil is not allowed to drain completely in the spring and therefore water is conserved in the soil profile to meet crop water requirements in the summer. Furthermore, any rainfall during the growing season would also be conserved by the system. It may be noted, however, that no water is pumped back into the system, and therefore the cost of such a system is minimal.

The usefulness of controlled drainage systems can be studied in the following example: for the St. Samuel loamy sand soil, it has been determined that we can maintain an upward flux of 5 mm/day from a water table depth of 105 cm from the soil surface. If we set the water level in the overflow structure at 70 cm below the soil surface in late April and assuming that the average depth of the drains is 105 cm, we have 35 cm, i.e., 105 cm minus 70 cm, of additional water storage in the soil profile that could be used by plants later on. The drainable pore space of the soil is estimated at 0.25. Therefore, 35 x 0.25 or 8.75 cm depth of water would be available to meet crop water requirements. How long will this water last in the growing season? Assuming daily potential evapotranspiration rates for June, July, and August as 3 mm, 4.5 mm, and 4 mm per day, respectively, and losses due to deep seepage as 1 mm per day, the total crop water requirement is 34.5 cm. Further, assuming average monthly rainfall in June, July, and August to be 8.3, 8.5, and 8.7 cm, respectively, there will be a total of 34.25 cm (8.75 cm + 25.5 cm) depth of water available in the "soil reservoir" to meet crop water requirements. It may be noted that we have assumed all rain water goes into soil storage which is true for most of the agricultural land in the Ottawa-St. Lawrence lowlands. Nevertheless, it appears that controlled drainage systems might be able to meet the crop water requirements on many farms in an "average" year.

It may be noted that subirrigation or controlled drainage systems are now recommended for flat agricultural lands where an impermeable layer exists at a shallow depth from the soil surface (about 2 to 3 m). Moreover, field trials have been

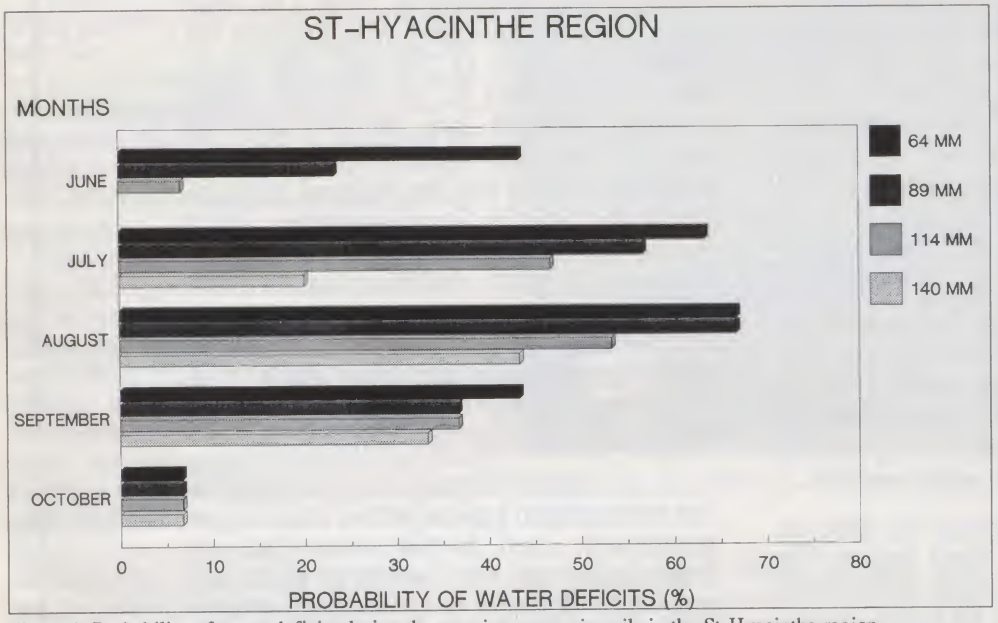


Figure 1. Probability of water deficits during the growing season in soils in the St-Hyacinthe region.

Photo 2. In comparison to Photo 1, there is no subirrigation being used in this cornfield.

conducted so far only on coarse- and medium-textured soils and therefore they are **not** recommended on clay or clay loam soils. However, research efforts are currently underway to evaluate the performance of these systems on fine-textured soils.

The combination of subsurface drainage and subirrigation systems has been examined in several field studies in North America. It appears that crop yields may increase significantly from subirrigation or controlled drainage systems in Quebec. However, the increased yields would be more significant in dry years than in wet years. This is intuitive as in a wet year there will be little or no need to provide supplemental irrigation to meet crop water requirements.

It appears therefore that all farms in humid regions, wherever possible, should have some form of water management system, be it subirrigation or controlled drainage. With little new investment, the benefits from such systems could prove to be significant. Furthermore, such systems may play a significant role in reducing non point source pollution from agricultural sources by keeping the agricultural water within farm boundaries for extended periods of time. Most pesticides have a half-life of a few months and therefore when the water is released from the farm in early fall, the toxicity of these chemicals may have greatly reduced. On the other hand, farmers might also benefit from this situation as the leached-out fertilizers might get another chance to become re-available to the plants during the upward movement of water.

In other words, use of water management systems in humid regions is a winning combination for farmers. They may not only benefit from the increased crop yields but may also help in controlling environmental pollution by reducing the toxic levels of effluent leaving farm boundaries.

Feb/89

Gouvernement du Québec
Ministère de l'Agriculture, des Pêcheries et de l'Alimentation

MINIMUM TILLAGE OF THE SOIL

LESS PLOWING AND MORE PROFITS

A few years ago, the idea of abandoning an agricultural practice as traditional as plowing would have seemed totally preposterous. Today, the minimum tillage of the soil and the management of surface residues appear as a veritable backbone of measures of soil conservation. The reason for this is simple : the presence of residues translates into a greater concentration of organic matter in the upper part of the topsoil. And it is in exactly this part of the soil that organic matter will be profitable for cultivation.

Residues hinder the crusting of surface soil. They prevent leaching and facilitate the seepage of water into the soil. In some cases, the fact of leaving only 10% of surface residues may reduce by 90% the problems of water erosion.

It is not necessary to plow in order to obtain a good seed bed in the first centimeter of soil. Most of the time a chisel plow is enough to break up the soil without burying the residues too much. At the deeper levels, the kind of soil desired is broken into small pieces, full of crevices and small tunnels, which facilitate the passage of roots. Once again, the best practice to obtain this result is . . . to do nothing. The action of frost and thaw, the rains and the presence of earthworms are sufficient to the task. In fact, plowing may sometimes contribute to compacting the soil when it is already sufficiently broken up.

The presence of plant residues may slow up the warming of the soil in the spring. This is an important factor if you want to sow early and use late varieties which give good yields. However, if the residues are well incorporated into the first centimeters of soil, you will decrease the possibilities of finding yourself with a soil which remains moist too long.

With these numerous advantages, the minimum tillage of the soil is beginning to have its followers. "In the region of Saint-Hyacinthe, there is far from a majority of producers who practice the minimum tillage of the soil, but those who do practice it, do so over large surfaces and are very satisfied with the results," explains Yvon Pesant, development counsellor for the regional office of the M.A.P.A.Q. in Saint-Hyacinthe. These producers are often considered as leaders in their community and this situation could encourage a rapid development of the minimum tillage of the soil, even more so that this technique has shown itself to be efficient on several types of soil, including heavy soils like clay and clayey loam.

Yvon Pesant points out that it is not necessary to buy expensive agricultural equipment, such as the chisel plow, in order to practice this method of conservation. It is possible to accomplish it with traditional instruments such as the cultivator. It is very difficult to make general recommendations in this sense because the situation varies according to the types of soil. As for the seeder, you must take the time to adjust it well and to add an opening device to remove the plant residue from the sowing rows.

Usually it is necessary to modify the phyto-sanitary control in order to adapt it to the presence of residues. It may be necessary to use more pesticides. For the moment, producers in Saint-Hyacinthe have simply increased the volume of the dilution of pesticides at the time of their application. Moreover, the cover of residues hinders the leaching of pesticides and reduces the run-off of soil and fertilizer. Futhermore, residues encourage the seepage of water, which could become a great advantage on warm summer days when there is a lack of water.

Gilles Parent

The Degradation of Soil Physical Structure

by Professor Edward McKyes
Department of Agricultural Engineering

In the past 30 years severe degradation of farm soil physical structure has been observed, especially in the wet temperate areas of North America. The principal reasons for this phenomenon are twofold, one being the change of farming practices away from pasture and legume crops to increased monoculture of row crops such as silage or grain corn. In addition, the power and weight of machinery, including tractors and harvest combines, has increased considerably over this time period, thus raising the loads and pressures which are applied to the topsoil and tend to compact it. As the soil becomes more compact, a situation which is worsened by losses in soil organic matter as well, it becomes harder in structure, more difficult to plough each year and less receptive to the proper development of plant root systems. As well, the soil storage volume for available water is reduced, leading to additional stress on growing plants during dry periods of the growing season. All of these effects result in later maturing of crops and diminished yields at harvest time. In cases of extreme soil compaction, no crops grow at all, but even moderate overcompaction of the soil (an increase in soil bulk density of 15 to 20 per cent) can lead to appreciable losses in crop yield (20 to 30 per cent or more). The economic effects of this situation are evident since the cost of production remains roughly the same in deteriorated soil, but the production yields are lowered.

The realization that soil compaction has become a serious agricultural problem has led to studies of the causes and effects of the process during recent decades. Work has been carried out since the 1960s in West Germany, England, Scotland, Sweden, Australia, and several areas of the United States, as well as in Canada. The first thing that researchers wanted to look at was the causes and severity of soil compaction and how it might be reduced in agricultural practice. By conducting tests on soils in the laboratory and in the field using real tractors and other machines, the relative effects of tractor weight, tire sizes, soil moisture content, and soil conditions were assessed. The findings of the principal causes of excessive soil compaction and physical deterioration are listed in Table 1.

The results of soil compaction on silage corn growth. The plot on the left received 15 passes of a 4 tonne tractor, while the plot on the right was travelled only once by the same tractor. The yields for the left plot were reduced by some 40 per cent.

The high ground contact pressure from wheels of heavy machines was found to be one of the most important causes of soil compaction. Since the 1950s, the average weight of tractors used on large farms has grown from about 5 tonnes to over 10 tonnes with an accompanying increase in pressure applied to the ground and area of field covered by each tire. This is enough to compact a sensitive topsoil beyond the best soil structure for water storage and plant growth.

Also, when farmers try to prepare seedbeds and plant crops earlier in the season, the topsoil is often still quite wet from the spring snow melt. This makes all soils more prone to compaction under machinery traffic loads. If the soil were reasonably dry at the time of machinery operations, the resultant soil compaction would be several times less severe. Because there are many more fields of row crops like corn grown today than there were 30 years ago, more soil is bare without grass cover, and this, too, increases the soil's susceptibility to compaction. Too much soil cultivation during seedbed preparation is another factor leading to poor soil structure since the topsoil can become pulverized into an excessively fine structure and lose some of its physical fertility. This latter situation is made worse by the loss of organic matter in soils which are intensively cultivated with row crops and do not have plant or animal manure matter returned to maintain a proper organic matter balance.

On some grain farms in eastern North America, crop yields have been decreasing steadily over 10 years or more. At the same time it becomes more and more difficult to plough the soil each year, and either a larger tractor is needed or the width of the plough must be reduced. These are all symptoms of soil structure deterioration and can be linked directly to the causes mentioned above. Long-term tests of soil compaction by Professor Raghavan and his team at Macdonald College have shown that a field which is compacted severely will remain so for more than three years, even if cultivation operations are ceased on the soil, and yield reductions for corn continue to be 25 per cent below potential yields.

Do these facts mean that the situation is hopeless and that soil compaction is unavoidable in contemporary agriculture? Not really. Table 2 lists some of the practices which can be maintained in order to reduce potentially harmful soil compaction or to alleviate its effects once it has been diagnosed. The amount of topsoil cultivation and seedbed preparation should be kept to a minimum. The minimum amount required depends on both the type of soil on a farm as well as the crops grown. Some plant seeds and some planting machines are more sensitive than others to the flatness and even surface of the seedbed, and these conditions will require

more work to be performed on the seedbed than others.

The ultimate reduced tillage management scheme is zero tillage. This practice shows some promise for northern humid areas, although it has not been tested sufficiently on farms to give guarantees that it will function reliably and consistently. However, Professors Raghavan and McKyes, together with students John Kelly, BSc(AgrEng)'79, MSc'85, Gordon Owen BSc(AgrEng)'82, MSc'85 and Anne Weill PhD'88 have conducted extensive field tests over 10 years on zero tillage corn production. These tests were done on both sandy and heavy clay soils, and they showed, at least at the test plot scale, that direct drilling of seeds into the previous year's stubble, with no ploughing or discing, can provide good crop yields in Quebec's climate. A special high pressure seeding drill must be used for planting because the topsoil is harder than would be the case with conventional seedbed preparation. Also, close attention must be paid to weed populations and control measures applied expediently. Otherwise, annual and perennial weeds can grow to excessive amounts and harm the production crop.

Other practices which can be adopted to reduce the harmful effects of severe soil compaction include the use of lighter tractors, wagons, and harvesting machines where possible. In addition traffic or working on the soil should be restricted where feasible to periods of the year when the topsoil is reasonably dry. Also, crop cultivars which mature relatively early should be seeded in order to prevent late harvesting when the fall rains and cool weather cause high levels of moisture in the soil.

Finally, if it is found that a field has been compacted too much over the years, there are some measures that can be taken to improve the structure of the soil and restore its physical fertility to near original conditions. Deep tillage work is the first step, using a mouldboard or chisel plough at operating depths of 20 to 25 cm, or a subsoiler can be operated at 25 to 35 cm depth if the compacted soil layer is found to be that deep. It has been shown in field tests that a large fraction of crop yield losses caused by soil compaction can be recovered by these means. In addition there is the possibility of planting legume crops with strong roots, which themselves will effect improvements in soil structure over time. If these crops are not especially valuable for feed production, they can be ploughed in as a green manure to improve soil structure still further and to increase the soil organic matter content. For a long-term solution to deteriorating soil physical structure, grass or legumes can be included in a systematic crop rotation scheme, together with higher value crops. This can assist in stopping the continuous reduction of soil chemical and physical quality and can help to maintain continued soil fertility and crop yields.

TABLE 1: Causes and Effects of Soil Structure Degradation. (Vivez Bien avec la Terre, Agriculture Québec 1988)

CAUSES	EFFECTS
— High ground contact pressure from wheels of heavy machines	— Shallow plant root systems and deformed roots
— Wet soil at the time of machinery traffic	— Late maturing of crops
— Cultural practices associated with monoculture row crops and bare soil	— Reduction of soil drainage and poor soil aeration
— Excessive seedbed mechanical preparation leading to finely pulverized soil	— Reduction in available water and nutrients for crops
— Poor choice of crop cultivars requiring early seeding or late harvest	— Increase in surface water runoff and soil erosion
— Loss of soil organic matter	— Slow decomposition of plant residues
— Excessive slipping of tractor wheels on the soil	— More energy required to till the soil
— Heavy animal traffic	— Reduction in crop yields

TABLE 2: Practices to reduce or alleviate soil compaction.

- Perform only the minimum amount of soil cultivation needed for crop growth.
- Avoid tilling or travelling on the soil when it is wet.
- Choose crop cultivars which mature early enough for harvest in favourable soil conditions.
- Use smaller tractors, or larger and double tractor tires to reduce ground contact pressure.
- Reduce soil compaction by deep tillage, subsoiling or strong-rooted crops.

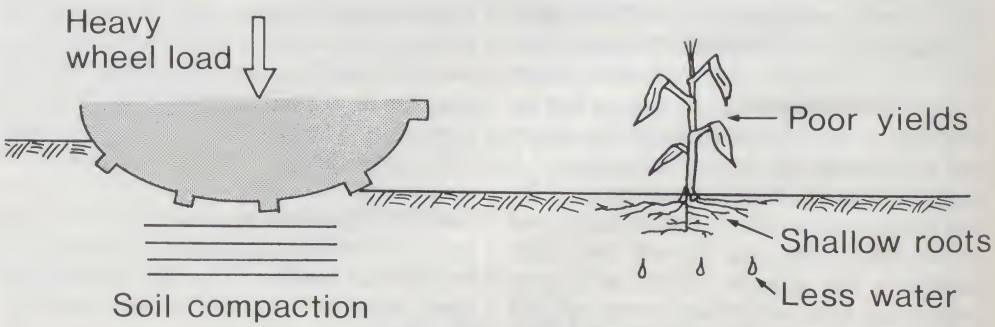


Figure 1. The main effects of severe soil compaction by heavy machines.

Gouvernement du Québec
Ministère de l'Agriculture, des Pêcheries et de l'Alimentation

RIDGE TILLAGE

SAVINGS GALORE

A method for row cropping with all the practical benefits of conservation, to say nothing of lower production costs? Tell me more, you say. Very well: in two words, Ridge Tillage. The key to this system lies in building ridges 10 to 18 cm high. These will remain in place from one season to the next. As in minimum tillage, the residues are kept at the surface of the soil, but concentrated between the ridges. Tops of the ridges are easily drained, which allows for more rapid warming in the springtime, even where drainage is not ideal.

The cultivator must be used judiciously in this type of tilling. It must be sufficiently heavy and robust, like those used for potatoes. Over the first year, corn, for example, is allowed to grow to between 45 and 90 cm, after which the ridges are rebuilt. Harvesting is done in the usual manner, except that machinery must not run over the ridges. The axles on the farm machinery used for this purpose must be so arranged that the wheels are spaced to fit the ridges.

The ridge will be next year's seed bed. The planter must be adapted, and a skimmer attached in front of each planting unit. In this way, two or three centimetres of earth can be removed from the tops of the ridges. The first cultivation is done once the corn has reached 15 or 20 cm. This involves partly destroying the ridge and mixing the soil with amendments. Nitrogen can also be spread in strips. When the plants have reached 45 to 90 cm, a second cultivation is called for, and the ridge is reshaped, as was done the first year. No further cultivation is called for until the following spring's seeding.

This system must not be used if the slope of the land is greater than 6% to 8%. If planting is done at right angles to the slope, the ridges will not keep their form, whereas if it is done parallel to the slope, too much water will flow down between the rows.

Farmers who have done ridge tillage in the United States report considerable savings: up to 25% less time devoted to field work; 27 litres of fuel saved for every hectare of field, and up to 60% less herbicide sprayed, since this is applied in bands. It is estimated that overall production costs drop by 20%.

Claude Mercier is a producer at Saint-Roch-de-l'Achigan. At present he is experimenting with ridge tillage, on a one-and-a-half-hectare lot. He, too, foresees that production costs will drop if this method is applied on a large scale. He calculates that two 100-HP tractors would be sufficient for an area of 600 hectares of corn.

With all these advantages, it is not surprising that this type of tillage is so popular with our neighbours. Jean Cantin, of MAPAQ's L'Assomption office, has described how, in Ontario, areas subject to this sort of cultivation increased from 3 000 to 5 000 hectares last year. And there is no basic reason why the same cannot happen in Québec. Over the next few months, we shall be watching Claude Mercier's results very closely, and be guided by them.

Gilles Parent

ON NOURRIT DE GRANDS *projets*

Québec

Waste Management Research

by Professor Suzelle Barrington
Department of Agricultural Engineering

The research carried out by the author and Research Assistants, Rockfeler Cap, Nader Naderpour, and Jacques Denis throughout 1988 was geared toward the following manure management problems:

1) reducing storage costs by introducing an economical liner for earthen structures not meeting the particle size requirements of the Quebec Ministry of Environment;

2) reducing the odour levels emitted from swine liquid manure storage facilities;

3) investigating the possible enrichment and improved settling of swine manures through the incorporation of kiln dust, another waste produced by cement plants.

The project concerning the development of a liner for earthen manure storages was carried out partially at Macdonald in the laboratory and partially at Michael Dunn's farm in Cowansville. The project is specific to earthen manure storages built of earth containing from 5 to 15 per cent clay particles. These soils cannot now be used for the construction of earthen manure storages. We are therefore developing a liner which can be installed at the soil surface and which will produce a seal just as effective as if the soil is of high clay content. The laboratory research work was performed to improve the selection of the type of geotextile, while the field test was carried out to observe the effects of natural conditions on the performance of the seal and the geotextile. The laboratory work indicated that a 40m porosity fabric (produced by Texel Inc. St-Elzear de Beauce, Quebec) was sufficiently small to induce the optimum seal. The field work demonstrated that the geotextile performs just as well outside as in the laboratory. The field work also demonstrated that this geotextile liner can reduce the construction cost of manure pits by 50 per cent; on the other hand, it adds a maintenance cost of some $300 per year, a small sum considering that $20,000 can be saved in capital investment. Macdonald College is especially grateful to Mr. Dunn for his cooperation and collaboration. The installation at Mr. Dunn's will be on view for a day next August.

Using a geotextile liner in the manure pit on Michael Dunn's farm in Cowansville.

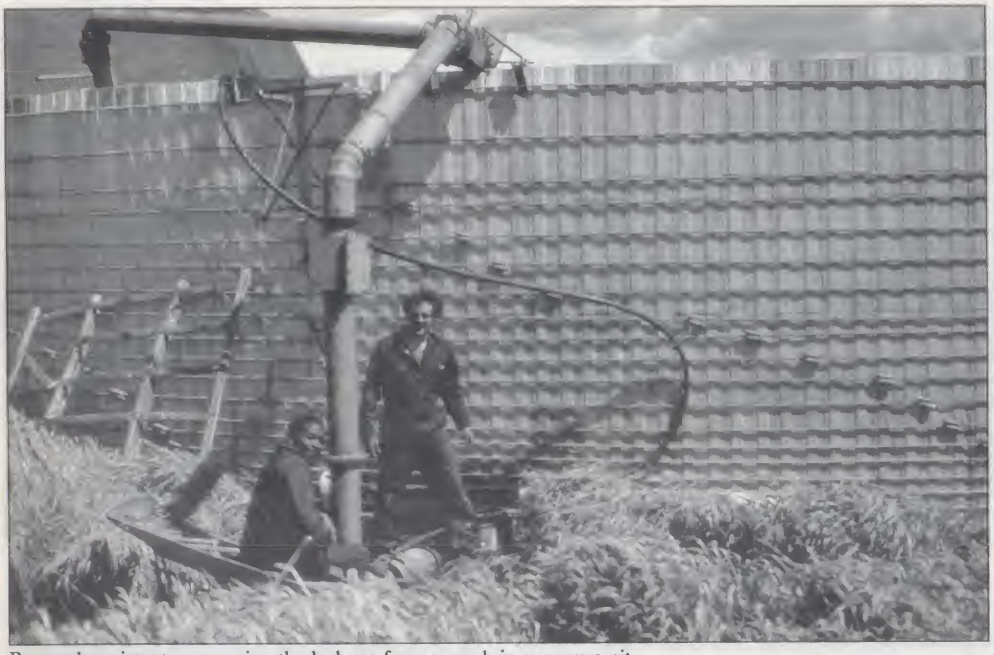
Odour Control

The project aimed at the control of odours from liquid swine manure storage facilities consisted in blowing about 8 inches of peat moss over a tank. The level of ammonia and odours being given off by this covered tank was compared to that of another tank on the same farm. This project was carried out at André Morier's farm in St. Damas.

Although this project is halfway through, we have found that there is an interesting amount of odour being cut off, especially during the warm summer days. There is more odour given off with the peat moss manure at mixing and spreading, probably because of gasses being trapped in the slurry during its storage period. Nevertheless, the amount of gasses given off at mixing and spreading is less than that which is released during the storage period. We found that the peat moss is very easy to blow over the tank. Mr. Morier proceeded to cover his liquid tank using a sawdust truck equipped with a blower.

Kiln Dust

As for the third project, we incorporated some kiln dust into swine manures in the laboratory to verify the improvement in the settling out of solids. All chemical tests are not completed, but the settling seems to be greatly improved. The liquid remaining on top after treatment is much clearer than that of pure swine slurries. The solids recovered at the bottom after settling were found to have gained some value in Potassium and Calcium as the kiln dust is very rich in these components. Some 75 per cent of the total nitrogen is lost with this mixing. Considering the K and Ca added, these elements improve the value of the swine solids much more than the Nitrogen lost. Thus, this incorporation was found to improve the value of swine solids by 50 per cent (for a net value of 150 per cent that of the original swine solids). Also, this process is very cheap since all it



Research assistants measuring the leakage from a crack in a manure pit.

requires is the addition and mixing of kiln dust to the swine manure. This process could easily be carried out at the prepit in any piggery. Storing the liquids coming off this settling process would produce further long-term settling; this is regularly done on all farms during the winter period.

Research for 1989

Research work for 1989, will also include the following:

1) developing an economical cover for the storage of solid manure from dairy operations;

2) the further verification of the sealing of crack and fissure in concrete tanks.

The development of a manure pile cover should lead, in the long term, to helping all cattle farmers storing manures under a solid form. This cover will be made of an impermeable geotextile; manure will be brought under this cover by typical underground evacuators. The introduction of such a system will encourage farmers to keep their solid manure systems. Solid manure systems are cheap to operate as compared to liquid manure systems; they produce little soil compaction (since solid manure is not as dense as liquid manure), and covers will reduce the odour emitted from manure piles. Furthermore, covers should cut down on the incidence of flies. We also hope that covers will compost the manure, thus making the fertilizer value less susceptible to leaching when spread in the field.

This manure pile project will be carried out at Mr. Dextradeur's farm in Iberville, Quebec.

In 1987 the author and Jacques Denis looked at the sealing of concrete tanks with manures. We found that the sealing occurs very fast and with manures even quite diluted. This summer, we plan to repeat the test with more accuracy in order to determine the size of cracks which can be sealed with manures. This research work should allow us to recommend floor joint design methods for concrete manure storage facilities.

Ventilation Research

The research carried out in this area by Professor Barrington and research assistants Ian MacKinnon and Roger Kinsman is aimed at improving ventilation systems for livestock buildings, greenhouses, fruit and vegetable storages, and grain drying systems. We investigated the design of ducts for all these types of ventilation systems and have arrived at developing a design criteria from the performance of ventilation ducts, a design method which had not yet been developed despite the fact that duct systems are very popular.

These duct systems are particularly interesting for livestock buildings as they can reduce drafts from outside cold air as it is pulled into the barn for ventilation purposes. Improving their design will allow better systems to be placed on the market. We have also found out that these duct systems require better or faster thermostats than already on the market. Further research is needed to verify this point and to develop new thermostats. Also, our research team expects to carry out research this summer aimed at determining the real value of good ventilation systems for cattle buildings. We know that ventilation systems now cost from $5,000 to $25,000 for dairy herds of 20 to 100 cows respectively. Many farmers refuse to spend such money simply because they do not see the economics of a good ventilation system. On the other hand, some farmers have paid for their ventilation systems in two years just from the increase in production.

Our new design system for ventilation ducts should help improve heat distribution in greenhouses and there fore save energy. Our system should help provide more uniform air distribution from ducts and therefore help to spread out the heat more evenly over the length of the green house.

More work will be carried out on ventilation over the next few years. This area is an important one, and it is felt that little attention is given to either by researchers or by farmers.

Feb./89

Post Harvest Technology

by Professor G.S.V. Raghavan
Department of Agricultural Engineering

The post-harvest phase is responsible for approximately two-thirds of "value-added," or non-profit cost of food at the supermarket. This phase includes drying, storage, processing, and packaging. Over the last 10 years, the Department of Agricultural Engineering has been involved in two important aspects of post-harvest technology: grain drying and long-term storage of fresh fruits and vegetables. Research in grain drying is aimed mainly at reducing fuel costs during the drying process while maintaining nutritive value and reproductive potential of seed. Work on long-term storage of fruits and vegetables is aimed primarily at lengthening the time for which fresh produce may be stored while maintaining nutritive and market quality (colour and flavour). Control of post-harvest diseases causing storage losses is gaining more recognition as an important part of long-term storage research.

Cereal and Grain Drying

Cereals and grains may be considered to be fundamental to human nutrition. Many societies depend almost wholly on these for carbohydrates, B vitamins, fibre and proteins. The main cereal and grain producing nations produce these foodstuffs only during a small part of the year and must therefore store them for long periods of time. Since natural drying in the field results in heavy losses due to weather, pests, and disease, rapid process drying is preferred.

Conventional methods of grain drying are based on forced air or convection which has a heat transfer efficiency of 35 to 65 per cent. If not combined with heat recovery systems and computer control, the overall efficiency of the drying process is much lower due to heat losses of the exhausted air. Over 100 billion gallons per year of propane are used to dry grain by conventional methods in the United States alone, more than half of this being used for drying of corn. An alternative that has shown the potential of reducing fuel consumption is particulate medium drying.

Particulate medium drying uses particles such as sand as the heat transfer medium.

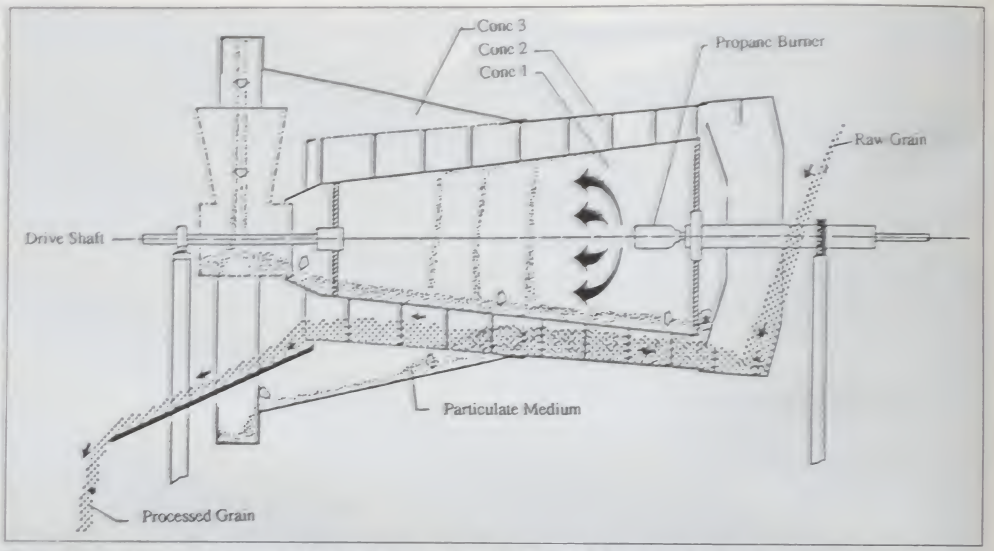
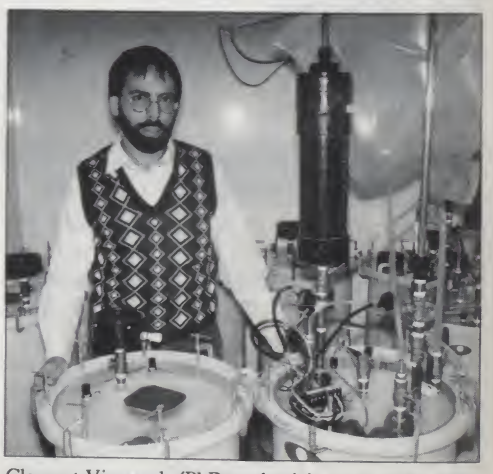


Figure 1. A schematic diagram of the machine and the flow-path of the particulate medium and product to be processed.

Essentially, the grain is immersed in heated particles for a given amount of time and then separated from the particles and cooled. The heat transfer efficiency of particle-to-particle conduction may be as high as 90 per cent, giving an overall process efficiency up to 10 per cent higher than convection drying. Three prototype particulate medium driers have been designed, built, and tested here at Macdonald College. Among these three, the third machine (Figure 1, U.S. Patent 4597737) is the most efficient. Student contributors to the development of the drier over the years have been Paul Richard, Henri Comolet, Stephen St-Pierre, Sylvio Tessier, Claude Bertrand, Kevin Sibley, Kulbir Pannu, Neil Grant, Karim Chirara, Thomas Dewavrin, Jocyline Ranger, and Raymond Cholette.

The main problem faced in particulate medium drying is that of moisture build-up which reduces the ability of the drier to remove moisture from the grain as the process continues. A potential solution to this problem, which should result in an even higher efficiency of particulate medium drying, is the use of molecular sieves as the particulate media. Molecular sieves such as zeolite have the ability to absorb moisture while transferring heat to the grain. The use of molecular sieves is currently the subject of research of PhD candidate Zaman Alikhani.

Some progress in improving convection drying by using spouted beds has also been made. The basic principle is that air to grain contact time per unit volume of air and the exposed grain surface area are increased if the air is forced at a high enough velocity to move the grain particles up through a spout such that they fall back down the sides of the drier and then recirculate. The heat contained by the air is therefore used more efficiently

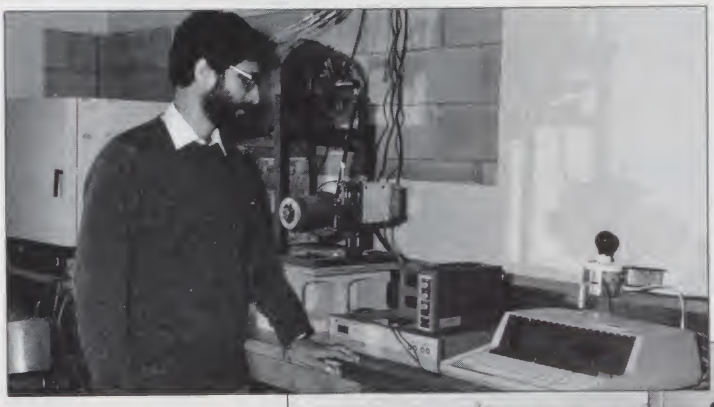


Clement Vigneault (PhD student) is ready to forge ahead with his experimental work.

than in conventional packed bed driers. Research on spouted bed driers is currently being conducted in collaboration with Professor A.S. Mujumdar, Department of Chemical Engineering, and Visiting Professor Dr. T. Kudra of Poland. Laura Passos of Brazil and Muhammad Issa Kalwar of Pakistan are working toward their PhD degrees in this subject area. Student contributors to the development of prototype driers are Karen Anderson, Dick Verlaan, Raffaele Giordano, and Kevin Renouf. Studies are also underway in microwave application for post-harvest research in collaboration with Professor F. van de Voort and Professor H. Ramaswamy of the Department of Food Science and Agricultural Chemistry.

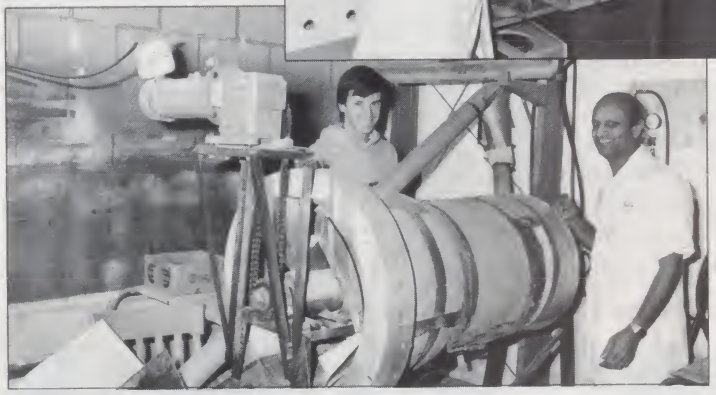
Long-term Storage of Fruits and Vegetables

Fresh fruits and vegetables are a major source of important vitamins and minerals. The demand for fresh produce, as opposed to processed (canned, frozen) fruits and vegetables has increased tremendously in Canada due to a revived health consciousness of the general public. While the development of the greenhouse industry is in progress, it cannot yet meet the demand for imported produce. Furthermore, the economics of winter greenhouse production (one alternative to importing) are viable for certain items only. An alternative which has been investigated here at Macdonald College is that of increasing the storage life of fresh fruits and vegetables by

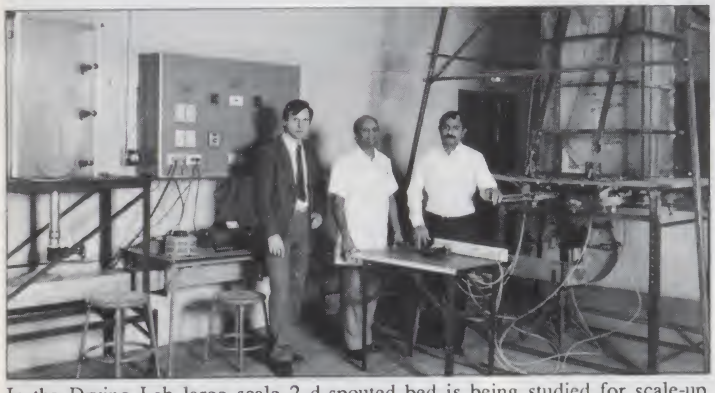


Zaman Alikhani (PhD student) with his adiabatic-batch type grain-medium contactor.

Professor Raghavan and Yvan Gariepy (Research Associate) in the post-harvest (storage) lab.



Marc McBratney (MSc student) and Professor Raghavan with the agitated particulate medium drier (prototype).



In the Drying Lab large scale 2 d-spouted bed is being studied for scale-up problems by Dr. T. Kudra, Professor Raghavan and Muhammed Issa Kalwar (PhD student).

Dr. T. Kudra and Professor Raghavan discussing some design concepts in Agricultural Engineering. They are in the Drying Lab examining the two dimensional experimental drier.

improved storage technology. The basis is that if local produce can be stored for a longer time, it can be supplied through most of the year and thereby stimulate production. The main aspect of the research conducted here has been the development of controlled atmosphere storage systems.

Controlled atmosphere storage refers to storage of fresh produce in atmospheres low in oxygen and rich in carbon dioxide. The main effect is to reduce the respiration or breakdown rate of the produce and therefore increase its longevity. This concept is not new by any means. Controlled atmosphere technology has existed for at least 40 years. However, conventional methods of providing better storage atmospheres have high operational and maintenance costs and are therefore prohibitive in many circumstances.

In 1960 the French scientist, Marcellin, recognized that silicone membranes could be used in storage applications. Silicone membranes have the property of being more permeable to carbon dioxide than to oxygen and therefore are useful for establishing low oxygen and high carbon dioxide atmosphere in the storage room. In a silicone membrane storage system, external controls and maintenance costs are minimal since the atmosphere is essentially established by the stored product itself.

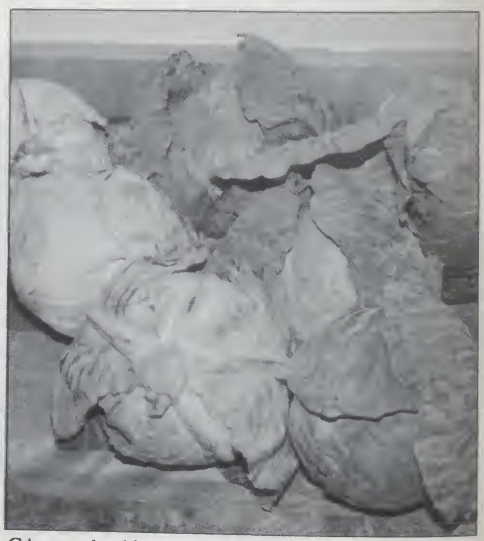
Marcellin's work has been continued here at Macdonald College. While he concentrated mainly on packaging of apples, we are successful in applying his concept to storage of important local vegetables such as cabbage, celery, rutabaga, and leek. The research has been aimed at determining the best atmospheric composition for different items and at overcoming the limitations of silicone membrane storage systems. The main limitation is that it is not always possible to provide the "best" atmospheric composition for a product using just a silicone membrane window on the storage unit. Perhaps the most important result obtained so far has been in application to cabbage storage. Six different producers in Quebec and Ontario have built commercial-scale silicone membrane-based storage facilities for cabbage and have all benefited from off-season marketing of their produce. An economic analysis of silicone membrane-based storage systems has shown that an internal rate of return as high as 27 per cent could be achieved. While more refinements are possible and being developed, research in this area is now aimed at disease detection in storage facilities, whether conventional or controlled atmosphere.

Early disease detection is extremely important for items such as carrots and potatoes. In Quebec losses as high as 60 per cent have occurred due to inadequate methods of detecting the proliferation of bacterial rots and moulds. Conventional methods of disease detection are usually based on human visual or olfactory inspection and are clearly inadequate. Other methods include monitoring of carbon dioxide levels and detection of "hot spots" in storage bins by means of infrared temperature detectors. An alternative which lends itself well to regular inspection and which may be much more sensitive than other methods is the monitoring of volatiles by chromatographic analysis. Volatiles are specific gases that are produced by the interaction of the invading organism and the produce. Preliminary work on potato and carrot post-harvest pathogens has been encouraging; however, this is the most recent aspect of storage technology to be investigated and much more work is needed.

Many students, technical staff, and researchers have contributed to this work over the last decade. They are: Yvan Gariepy (Research Associate), Dr. Sam Asiedu (Plant Pathologist), Professor Eric Norris (Physical Properties aspects), Professor Richard Reeleder (Pathologist), Reid Nattress, Ray Cassidy, Peter Alvo, Dave Murphy, Monique Chayet, Sylvie Monette, Richard Bovell, Sylvio Tessier, Guy Armstrong, Marcel Levesque, Tiong Er, Rejean Racine, Holly Phillips, Jody Barclay, Bing Lam, Jean-Marc Scazzosi, Mohsen Moindarbary, Peter Stevens, Alain Pietroniro, Robert Plasse, François Forcier, Denis Favreau, Christian Gosselin, and Yves Lepine. The volatile monitoring aspect was the subject of a MSc thesis by Eric Ouellette. Low oxygen and low carbon dioxide atmospheres are essential for retaining post-storage quality of apples. A system to obtain such a condition is being studied by Clement Vigneault for his PhD degree.

We, in the Department of Agricultural Engineering, wish to continue and strengthen efforts in education and research in the area of post-harvest technology which has not only national significance but also international relevance.

CA stored leeks after 170 days of storage.



CA stored cabbage after 265 days of storage.

Feb./80

Space Station Farming

by Hazel M. Clarke

Fresh food in outer space; protein for the hungry here on earth. Insect Farming! Insects for food! Why not, says Professor Robert Kok of the Department of Agricultural Engineering, who always seems to be several decades ahead in his thinking and in his research. The trouble with being ahead of your time is that a great deal of research needs to be done and that takes funding which has been difficult to obtain. Partly because the idea is so futuristic and, therefore, not a priority and partly because many find the idea unpalatable.

Professor Kok is convinced that one day man will travel extensively through space for long periods of time and will obtain his protein in a tasty, nutritious, and appealing form from insect farms. "Sooner or later they'll want fresh food, and you can bet they won't be raising cows and pigs up there," he said. He pointed out that it will be possible to construct insect farms which are physically quite small but having a high volumetric production rate. There can be small-scale insect farming or enough protein could be produced for a billion people in a 200-acre complex. "And that is approximately as many people as there are now who are short of protein," Professor Kok said recently.

Professor Kok not only sees insect farming becoming commonplace in outer space, he also sees it as a distinct possibility here on earth, particularly in third world countries where there is a constant need for protein-rich food. Some insects are easily raised and harvested. Their food requirements are usually for low quality materials that are easily obtainable, and inexpensive. There is no need for intricate transportation and storage systems. Farming could be done in densely-populated areas to feed large numbers or individual families could have their own insect farm. Thoughts for the future. Meanwhile, Professor Kok and MSc student Kanda Lomaliza have been conducting research here at Macdonald.

I mention above that some insects are easily raised. Kanda Lomaliza, who came to Canada from Zaire, pointed out that there are two

A tray of flour beetles is being incubated by Kanda Lomaliza.

categories of insects: flying insects and non flying insects, and they have found that it is preferable to raise non flying insects as they are easier to control. He said that the medium they are raised on is important and that it should be very granular and dry and easy to separate from the eggs and from the adults. In their research they have been using flour and flour beetles, and millions of flour beetles are being grown in Professor Kok's basement laboratory where an incubator was adapted from a plant growth chamber. Trays of flour are first placed in the incubator for several days and then are filled with adult flour beetles. The insects feed on the conditioned flour and lay eggs that turn into larvae which are almost pure protein. The eggs are separated from the adults, with the latter starting the cycle all over again. The eggs are placed in a new tray of conditioned flour in another section of the incubator. It takes about 21 days to get full-grown larvae ready to be harvested. The contents of the tray are sifted with the larvae staying on top and the flour going to the bottom where it is collected in a pan and recycled. Some of the larvae are placed on another tray of conditioned flour, placed in the incubator and will be raised to adult flour beetles to continued the life-cycle. The remaining larvae is frozen, freeze-dried or used immediately.

The larvae are not used alone but as one of several ingredients in a recipe. Professor Kok

Kanda Lomaliza and Professor Robert Kok hosting a luncheon using flour beetle larvae in some of the foods.

feels that beetle larvae can be mixed in with low protein foods to make a much higher quality product. Robert Kok and his research team have developed recipes for bread which people have found quite acceptable. As well, larvae have been used in soup, mixed in with rice, spaghetti sauce, sausages, and a sandwich spread. A recent recipe for hot dogs has been particularly popular! Students, staff, and visitors interested in these potential foods of the future have occasionally been asked to come to lunch and try a new recipe.

Kanda Lomaliza said that insects are already eaten in many countries of the world, the most common being caterpillars, grasshoppers, locusts, and crickets - the flying insects. He pointed out passages in the Bible that said such insects as locusts and beetles should be eaten. They are clean insects as they feed on grass and vegetables.

Insect farming is a new type of animal husbandry, one that Professor Kok sees a need for, and one that he intends to continue working toward.

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The Faculties of Agriculture of the province contributed fully with new knowledge and drainage techniques: drainage depth, spacing of drains, soil permeability, the friction factor of plastic pipes, filters, subdrainage specifications, to name only a few.

At the peak of its activities, there were some 40 engineers working at the Service du génie du Ministère de l'Agriculture du Québec as well as six engineering firms doing contract work full time.

Farm Buildings and Machinery

Second but no less important was and is the area of farm buildings and machinery. The division started with Bruno Chartier in 1921, but it was only in 1965 that an engineer, John Hogan, became head of the division. A few years later, Guy Jacob, a graduate of Macdonald College who had been working at the farm building division since his graduation in 1963, opened the Division of Farm Machinery in 1970 and rushed enthusiastically into field evaluation of farm machinery. In 1975 Guy Jacob became the head of the Division du machinisme et des constructions rurales.

Today the division has some 170 farm building plans which cover farmers' needs in livestock housing, produce preservation, and accessory buildings. The plans show the floor arrangement, the structure, wall construction, ventilation, and the mechanical and electrical devices.

Today's Challenges

In 1989 we are facing huge food surpluses resulting from the continued growth of production in industrialized countries as well as increases, sometimes spectacular, in some developing countries. We live in an urban and industrial civilization which shows a permanent trend towards becoming a society of leisure. There is a greater concern for the environment and quality of life, altered nutrition habits, and new technologies. We have even reached a point where food selection is no longer dictated by our financial means but rather to a large extent by health considerations. It would seem, therefore, that the Ministry of Agriculture has no choice but to promote changes in production in the agri-food industry to meet new market opportunities and requirements, while at the same time respecting the equilibrium of the ecology.

The equilibrium of the ecology includes watercourse protection and the recycling of organic residues, particularly manure. Introduction of the 1988 program of subsidies for manure storage was a gigantic step in this direction. Over a period of 10 years $40 million should be granted through this program and the agricultural engineer will be expected to play a leading role.

This program needs some improvement in order to better protect the environment as well as public and private investment. For example, the design specifications should be tightened for more flexibility of utilization and a longer life span. All structures should be designed by an engineer and built under the supervision of a qualified engineer, with the conception made in a context of rational and profitable manure management.

Food Engineering

Agri-food engineers are unique in the sense that they are the only engineers to work on biological systems, and it is only natural that they are called on for solutions to problems related to the processing of agricultural products. It is essential that our agricultural engineering departments start training engineers in agricultural products processing in order to take care of the growing needs of our industry. In order to become a specialist in food processing one has to know agricultural products as much as a plastics engineer must know his plastics.

Coming Events

On June 14 to 16, 1989, Quebec drainage contractors will meet at Montebello to celebrate the twentieth anniversary of their association. Everyone interested in drainage will be invited. The association, which was born in the shadow of Macdonald College, has become strong enough to form, together with the Ministry of Agriculture, an advisory committee which watches over subdrainage installations in the province.

On June 25 to 28, 1989, the Canadian and American Society of Agricultural Engineers will have their third joint meeting, this time in Quebec City. The theme of the meeting is "Global Entrepreneurship Impacting Agricultural Engineering." Some 1,500 engineers from all fields of agri-engineering and bio-engineering are expected. Most will come from North America, but there will be representatives from all over the world. Years may pass before such an event comes to Quebec again; no one should miss it .

Silicon, Silicon Everywhere But Not a Chip to Think — Yet!

by Professor Chandra A. Madramootoo
Department of Agricultural Engineering

Over 100 years ago, when Charles Babbage, an English mathematician and inventor, developed the forerunner of today's digital computer, he would not have imagined that silicon would enter our food chain in such enormous bits and bytes. This incredible material has made a significant impact on food and agriculture over the past 10 years and more revolutionary changes are yet to come!

Silicon is everywhere and in almost everything. Approximately 87 per cent of the earth's solid crust is comprised of silicon compounds. Crops root in soil composed largely of silicon. Livestock beat their hoofs into it, and our dinnerware is often made of silicon. This unique compound is processed to form minute microprocessor chips which can be found in the many gadgets surrounding our lives: from clocks to microwave ovens to personal computers. Silicon chips now process data and control functions on the farm, in the factory, and in food service centres. Silicon chips help to eliminate human error, tedium, and reduce accidents in the workplace.

Some Remarkable Achievements

The cab on a new tractor or combine resembles an aircraft cockpit. Agricultural machines have on-board computers which monitor and control engine performance and selected tasks, eg., threshing speed and stubble height during combining. Crop planters and chemical applicators possess microelectronic circuits which measure seed and chemical flow rates and display the results in the tractor cab. The operator can make necessary adjustments without leaving the cab.

New irrigation systems rely on electronic sensors for measuring soil moisture. These sensors are linked to microcomputers and the valves on irrigation systems. Based on climatological inputs and moisture content of the soil, the computer calculates, on a daily basis, the amount of water required for adequate plant growth. Computer controlled circuits then switch the irrigation system on and off, as required.

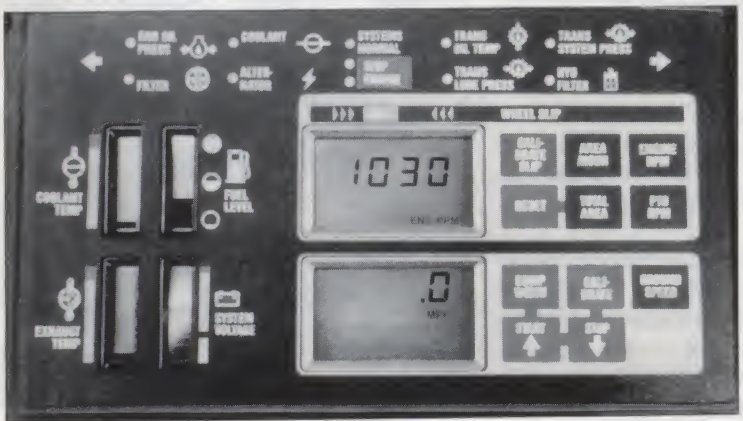
Computerized and automated controls are also found in greenhouses, crop drying and storage facilities, and livestock barns. Data collected from temperature, humidity, light, and wind sensors are fed to computers, which in turn operate heat, fan, and light switches.

Recent advances in the field of bio-process engineering have led to the development of a wide variety of new microelectronic sensors. Physical, chemical, and biological phenomena, which were previously difficult to measure, are now being monitored to a high degree of precision. These sensors are interfaced with high-speed minicomputers to control operations in food processing and fermentation plants as well as in genetic engineering laboratories.

The livestock industry is a major user o computers. A very good and well-knowr example is the Dairy Herd Analysis Service (DHAS) on the Macdonald campus. Lap-top or portable computers are being used right or the farm to collect data and generate on-farm reports. Back at Macdonald computers are used for storing and retrieving data from milk analyses, and in genetic selection. The data can be further used to formulate feed pro grams. Computer controlled systems mix the ingredients; silicon chips control anima consumption of the feed.

Several farm management software packages are now available to assist with decision-making on the farm. These software allow the farm manager to select appropriate machinery, determine when to perform field operations, make decisions on investments and labour, analyse budget and cash flow scenarios, and draw up financial plans.

Silicon chips are at the heart of a new generation of data acquisition systems and environmental sensors, and plant pathologists and entomologists are fast becoming users of thi equipment. Climatic and plant growth data are automatically collected and stored on tiny memory chips. Microprocessor systems are programmed to predict the response of pathogens to prevailing weather conditions and to



Close-up of computerized instrumentation panel; adjustments can be made without leaving the cab.

A robot in the food service industry. Photo courtesy Procter & Gamble Inc.

monitor disease progress as a function of climatic influences, thus allowing timely control strategies to be developed and avoiding unnecessary chemical applications. Plant physiologists also use these data to understand response functions and predict yields.

In tandem with the advances in silicon chip technology is the prolific development of computer software. Computer simulation models are powerful analytical tools. We now use computer models, for example, to develop environmentally sound agricultural management practices, with emphasis on reducing soil erosion and chemical pollution of streams and groundwater. In the food service industry computer programs are employed to generate menus. In hospitals computer formulated diets are prepared for specific patients.

An Imaginative and Creative Future

Despite rapid advances in computer hardware and software, as well as in microprocessors, we have not yet developed a silicon chip capable of imitating the human brain. Attention is therefore now being focussed on this new frontier of artificial intelligence. Can the intellect, reasoning, judgement, and accumulated knowledge of man be encapsulated in a minute silicon chip? Furthermore, can these "intelligent" chips replace, for instance, traditional farm equipment and routine operations? Robotics, computer vision, and expert systems are attempts in this direction. Although currently experimental, these technologies may well control farm and factory operations in the future.

Robots and intelligent machines will use microprocessors and multiple sensing devices to make decisions and carry out complex mechanical manipulations. Some food processing plants are now using robots to mix ingredients and fill containers. In the future robots will transplant, cultivate, spray, harvest, and pack crops on the farm. The computer software which drives robots can be changed, thus allowing one robot to conduct multiple tasks. Eventually the software will be programmed by voice and will have the capacity to employ artificial intelligence, which will allow it to learn from the robot's past experience in order to continually upgrade control functions.

Computer vision, or optical image analysis, allows intelligent machines to differentiate colour, shape, and size. Fruit and vegetable harvesters of tomorrow will have the capacity to identify products ready for harvest and use robots for the picking operation. Optical imaging systems will handle and sort fruit, vegetables, and eggs. There are also potential applications for this technology in food processing and meat grading plants. There are attempts in the forest industry to use computer vision and robots to prune tree branches. The machine also has the capacity to remove trees that are not of a certain size or shape.

Expert systems are special computer software enabled by silicon technology to reason, analyse, and make decisions at proficiency levels approaching that of a human expert. An expert system is comprised of a knowledge base and a set of operating rules. Once developed, it can raise the performance of the average worker to that of an expert. In crop management, farmers and extension workers can use expert systems to identify potential pest, disease, and weed outbreaks and nutrient and water deficiencies. The expert system will advise on appropriate remedial action. An expert diagnostic aid has been developed to solve reproductive problems in dairy cattle, and it is evident that expert systems will be able to diagnose livestock diseases. The farmer and agribusiness manager of tomorrow can rely on expert systems for decision-making and planning, budgeting, and marketing strategies.

Our natural resources will be mapped from geographic information systems using satellite and remotely sensed images. This information will provide the data base for expert systems to select technically and economically feasible soil, land, and water conservation measures. An exciting potential is the use of expert system technology to transfer new information from the laboratory to the farm. As extension specialists, experienced farmers, farm managers, and researchers share their expertise with a common knowledge base, expert systems will become more intelligent and capable.

The impact of these technologies on society, especially with respect to labour displacement, will be debated. Will farm and factory efficiency, safety, processing and product reliability, a nutritious, appealing and cheaper food product, a protected environment, and food security be over-riding considerations?

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Modern tractor cabs reflect new designs for safety, comfort, and productivity, using computer-aided instrumentation.

Energy Conservation in a NORDIC Type Greenhouse

by Herve Bernier, ITA, La Pocatière,
Professor G.S.V. Raghavan, Macdonald College,
and Jean Paris, Ecole Polytechnique

The high cost of energy has forced greenhouse owners and researchers to look for more efficient means of production. During the 70s solar energy was seen as a possible alternative for reducing fossil fuel consumption.

Since conventional greenhouses are not efficient in collecting and storing solar energy, attempts were made in the late 70s to optimize the structure for collection and to develop techniques for the storage of the excess solar heat entering a greenhouse. An excessive heat input situation due to the greenhouse effect is often encountered in a greenhouse during daytime. Ventilation has to be used to evacuate the excess heat and maintain adequate temperatures, while at night heat has to be supplied to the greenhouse. The storage of excess heat might represent a short-term solution for the greenhouse industry's high heating costs, while the development of energy efficient structures might be seen as a long-term goal.

Water, crushed stones, and phase change materials have been proposed to store solar energy and have been used in experimental setups with limited success. This is due mainly to the high capital cost involved for the storage installation, resulting in long payback periods.

The soil within a greenhouse represents an important thermal mass, which is under used. By providing a suitable heat exchange surface, soil can become a relatively low cost storage material. Further, it has been shown that a higher root zone temperature will lead to a beneficial effect with regard to crop yield while reducing the energy consumption. Soil heat storage, therefore, is advantageous for soil-grown crops.

A heat exchanger-storage system, using soil as a storage medium, was designed and built in a NORDIC type greenhouse. The greenhouse, oriented east-west, is located at the Institut de technologie agro-alimentaire in La Pocatiere, Quebec.

The heat exchanger-storage system made of 26 non-perforated, corrugated plastic drainage pipes, 102 mm in diameter, was buried in the soil. Two rows of 13 pipes, 12 m long, were buried at 450 mm and 750 mm respectively. The pipes run parallel to the longitudinal axis of the greenhouse, and are spaced 450 mm apart. A 0.75 kW blower was provided to circulate hot air collected in the greenhouse, through the pipes at a flowrate of 0.91 m^3/s. The heat stored was recovered both by convection at the soil surface and by forced convection in the exchanger pipes.

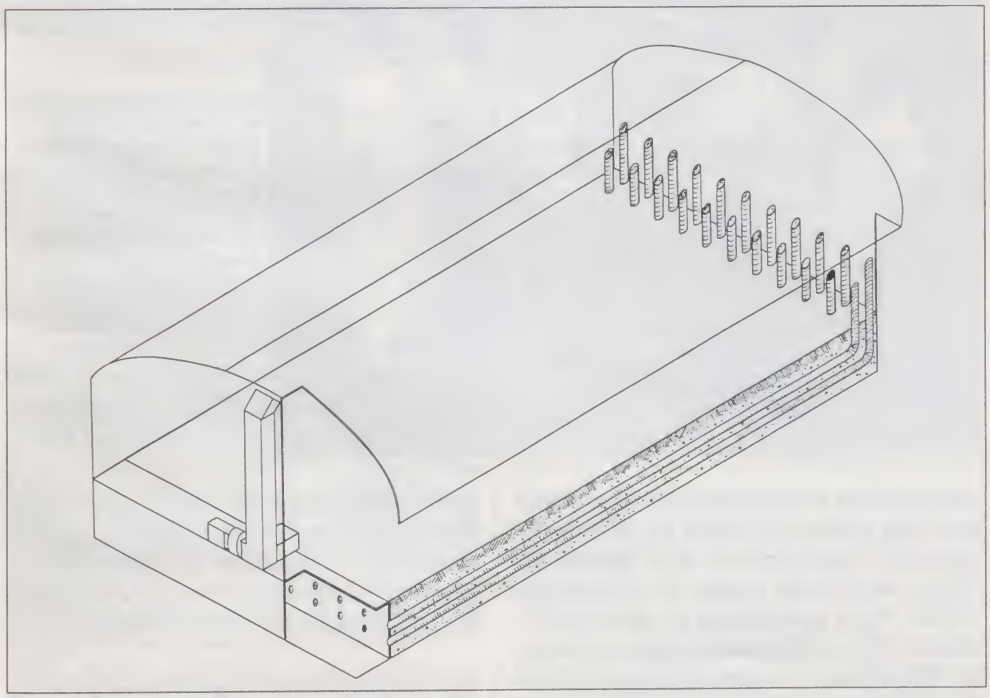

Figure 1. A schematic of a greenhouse heat exchanger.

Tomato plants growing in the new concept greenhouse.

The storage has a seasonal temperature fluctuation of 10°C. The system performance seems to be more influenced by greenhouse air temperature than by incident solar radiation. Values for the average coefficient of performance and pipe convective heat transfer coefficient were 3.6 and 12 W/m^2K respectively. Approximately 30 per cent of the heat recovered from the storage is exchanged by convection at the soil surface. Results indicate that solar energy contributed to 58 per cent of the heating requirements from February to June and from September to December 1986. This contribution represents 33 per cent energy conservation. Further, the system has a beneficial effect on crop growth and yield. For two consecutive growing seasons, soil grown tomato plants have produced yields of 25 kg/m^2 compared to recommended average yields of 15 kg/m^2 encountered in Quebec commercial greenhouses. The payback period for the system is estimated at two years, depending on the cost and crop management practice.

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Mac International

Agricultural Engineers Abroad

by Professor Edward McKyes
Department of Agricultural Engineering

Over the past few decades a great number of requests have been made of the Department of Agricultural Engineering staff to assist with problems of agricultural development and education in foreign lands. Often the volume of requests has been more than the staff could handle since a balance must always be struck between giving time to worthwhile and needy international causes and maintaining the quality of education for BSc and post-graduate students at Macdonald College, not to mention the services provided to the Faculty of Agriculture, the university, and the Canadian agricultural and engineering professional communities. Nevertheless, the staff have been able to embark on some international trips to lend their expertise and experience to others in need and the principal advantages have been threefold. First, the department recognizes that Canadians are an integral part of the world community, and we cannot ignore the plight of other countries in cases where just a moderate amount of time giving expert assistance can be a real help in the development of food production and processing for the benefit of populations in other lands. Secondly, it has usually been found that staff visiting and helping in foreign countries learn much about different cultures and technologies. This newfound knowledge may then be imparted to Canadian students during regular classes at home. Thirdly, the contacts made with government, professional, business, and ordinary people in other nations have a beneficial impact on the relationships between these countries and Canada, including the reputation of Macdonald College and McGill University.

The organization of staff trips abroad takes several different forms. For example, department personnel have served as External Examiners at universities in several Commonwealth countries including Nigeria, Trinidad and Tobago, Australia, and the United Kingdom. In such a capacity one is able to verify the quality of education and examinations in a particular university degree program as well as make concrete suggestions for changes to the teaching curriculum, in light of local educational background and needs.

Professor Broughton and John Mayo (with McGill caps) with a group of engineers in their Drainage Course beside a large diameter sakia irrigation water pump near El Ganiena, Egypt, October 1988.

Professor McKyes assisting with the surveying laboratory for part of the first year Agriculture class at the University of Zimbabwe, July 1987.

Some Macdonald graduates and colleagues studying Professor Madramootoo's soil erosion and water runoff plots in St. Lucia. Left to right; Leonard Leonce, BSc(AgrEng)'76, MSc'78, Peter Norville (MSc student), Professor Nazeer Ahmed (Soil Science, University of West Indies), Professor Ted Sheng (Colorado State University), Julius Polius (MSc Soil Science'86), Bertie Lake (MSc'68), February 1988.

Another form of interaction is official projects with other universities or government agencies. These projects often involve exchange visits to the country in question and visitors from government or university to Canada. Also, students are often involved at the BSc or post-graduate level, or for special intensive short courses. The objectives of such collaboration are specifically related either to the improvement or development of an academic program or to a technological program in agriculture such as irrigation, land reclamation, or food processing.

A third form of co-operation is the acceptance of students from other countries, either

on scholarships or with Canadian support. In many instances, students conduct their engineering design or research work at home and, when possible, the Supervisor makes a visit to observe and help with the student's project. Over the past decades such activities have taken place in countries such as Jamaica, Barbados, Brazil, St. Lucia, Zambia, and Trinidad and Tobago. For example, Chandra Madramootoo (later to come on staff in the department) did his MSc research in St. Lucia on the development of trickle irrigation for banana production, under the direction of Pierre Jutras in 1980-81, and Leonard Leonce, directed by Robert Broughton, did his MSc research in the same country on potential water requirements, collection, and storage. Nicholas Kwendakwema designed, built, and tested a small-scale forced convection indirect solar heated food dryer in Zambia during 1981-82, and his Supervisor, Robert Kok, visited that country to assist with the project. Students have come to study in the department from no less than 25 countries, and the intake of foreign students at both BSc and post-graduate levels continues to be about 15 per cent of total students. An added benefit for Canadian students is the interaction with foreign students in classes and college life.

Often official projects between institutions are combined with post-graduate student training. As an example, Professor Robert Broughton assisted with engineering work for the development of the Sugar Cane Feeds Centre (SFC) in Trinidad and Tobago. He made trips in each year from 1977 to 1981 to analyze and provide guidelines for staff and students working at the SFC. This was a co-operative project among the Government of Trinidad and Tobago, McGill University, and the University of the West Indies. At the same time, Patrick Cambridge completed his MSc degree ('80) on the first full-scale subsurface drainage system installation in Trinidad, at the SFC. Also, Patrick Jadoo did his Senior Project on an anlysis of the manure transport alternatives for the SFC, and subsequently completed his MSc at Macdonald in 1984, studying irrigation water supply for food crops in Trinidad. In addition, Jon Naugle, BSc(AgrEng)'80 got his start in overseas work as a resident engineer at the SFC, and he now works with his wife Michel on a project in West Africa.

Professor Broughton actually began overseas work in 1963 by teaching a course in hydrology and water management in Barbados. In 1967 - 1968 he supervised John Ionson who did his MSc thesis work on the performance of the first windmill powered sprinkler irrigation system in Barbados. During the rainy season of 1979, Professor Broughton went to El Salvador to investigate drainage problems with the staff of the local university, and to give lectures in water management. This type of activity continued in 1983 and 1985 when Professor Broughton and Bob Bonnell, BSc(AgrEng)'83, MSc'85 of the Centre for Drainage Studies travelled to Pakistan to assist in courses on the design and construction of subsurface drainage systems to prevent waterlogging and salinization of irrigated arid lands. Professor Broughton returned to Pakistan in 1983 to work with BSc(Agr Eng) graduate Colin Lovegrove ('71) and Wayne Wood ('79) on the subsurface drainage analysis for the 48,500 hectare Mardan Salinity Control and Reclamation Project (SCARP). Steve Ami, BSc(AgrEng)'75, and Etienne Perraton, MSc'81, also visited Pakistan in 1984 to provide training in quality control to staff at the drain tube factory established for the Mardan SCARP. Technical assistance to this project and to other projects in Pakistan has been provided since then by Professor Broughton, Steve Ami, and Gilles Bolduc, BSc(AgrEng)'78, MSc '82.

In October and November 1988, Professor Broughton, together with John Mayo BSc(AgrEng)'83 and Karim Chirara, BSc(AgrEng)'85, MSc'87 travelled to Egypt to put on a course on the design and construction of drainage systems for persons working on the Canadian aided Integrated Soil and Water Improvement Project (ISAWIP) which involves the drainage of some 28,000 hectares. John Mayo, Karim Chirara and Jacques Gallichand, MSc'83, will continue to work on this project together with Egyptian engineers and agronomists in the months to come.

In July 1988 a five-year co-operative project with the University of Cairo, funded by CIDA, commenced for assisting with the improvement of teaching, research, and extension in soil and water management. This project involves the upgrading of staff at the University of Cairo, post-graduate training of new staff for the university and the provision of scientific and teaching equipment as well as computing facilities. Professors Broughton, the author, and MacKenzie and Mehuys of the Department of Renewable Resources will be directly involved in this undertaking over the next three years, as will other graduate project engineers from Macdonald College.

The author also began overseas work quite some time ago in 1964 when he was put in charge of the design and construction of a bridge in Barbados for the Space Research Institute of McGill. Since then he has made visits to Antigua, Jamaica, Granada, Guyana, Trinidad and Tobago, Morocco, Kenya, Egypt, and Zimbabwe. The author was involved with Professor Broughton in the design and procurement for the first plastic drain tube fabrication factory in Egypt for the ISAWIP activities. During his 1987 trip with John Kelly BSc(Agr Eng)'79,MSc'85, he surveyed the building site and studied the feasibility of local construction of the factory and attendant storage silos and equipment needed for the installation.

In the same year, 1987, the author was appointed to the Working Party on the BSc Honours Agricultural Engineering Degree of the Vice-Chancellor of the University of Zimbabwe. The function of this Working Party is to establish the need for Agricultural Engineering graduates in Zimbabwe, and to make recommendations for the academic curriculum and administration of a BSc Agricultural Engineering Honours Degree program at the university. Since then, a CIDA-aided project between the Faculty of

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Issues in Human Nutrition

HEART SMART for a Healthy Heart

by Linda Jacobs Currie, University Coordinator
Professional Practice (Stage) in Dietetics,
School of Dietetics and Human Nutrition

Saturated fat, omega-3 fatty acids, high density lipoproteins (HDLs) and low density lipoproteins (LDLs) are quickly joining "cholesterol" and "polyunsaturated fat" in our everyday vocabulary. Along with high blood pressure, smoking, obesity, diabetes, and a family history of premature heart disease, these dietary and physiological elements are important in determining risk of and in preventing coronary heart disease. Putting research information on all these subjects together in a form that could be agreed upon by health practitioners, and applied in the daily life of consumers, was the challenge of the Canadian Heart Foundation, the Canadian Cholesterol Consensus Conference participants and scientists in the United States National Cholesterol Education Program. Reports and projects like HEART SMART are mushrooming in the scientific and public arenas. What can you anticipate applying to your health?

First we should look at the Risk Factor Checklist and see which ones apply. If you are able to tick "I'm OK" for the favourable effects group, you're off to a good start. If you need "to adapt" to achieve favourable effects, or if factors with undesirable effects apply to you, so will the HEART SMART programs of the Canadian Heart Foundation. Here's why.

We now know that overweight and obesity have a detrimental effect on heart health. Other components are important too. Lipoproteins are the form in which fat and protein travel in the blood stream. They include triglycerides, plus HDL (high density lipoprotein) and LDL (low density lipoprotein) cholesterol particles. The easiest way to remember this is to say **high** density HDL you want in **high** amounts and **low** density LDL you want in **low** amounts in your blood. An elevated LDL leads to accelerated narrowing of the arteries while an elevated HDL does the reverse. Dietary factors are known to affect the lipoprotein levels and therefore to affect cardiac health.

For example, studies have shown that saturated fats (found in animal fat and "hard" fat spreads) have a cholesterol raising effect while the fatty acids found in safflower, sunflower, soybean, and corn oil have a cholesterol lowering effect (as the word saturated suggests, it's easy to have too much). Another group of fatty acids found in olive and canola oils lower cholesterol when **they take the place** of saturated or hard fatty acids, as may the fatty acids from mackerel, herring, tuna, salmon, halibut, and the fish oils. The effect of the marine source fatty acids is even more pronounced in lowering plasma triglycerides and reducing risk of blood clots. Without worrying all the time about the type of fat or fatty acid consumed, studies have shown that **decreasing total quantity of dietary fat** lowers your cholesterol level, as does decreasing dietary cholesterol intake. Once fat is decreased, energy then coming from carbohydrates (fruits, vegetables, breads, cereals, etc.) is increased along with soluble dietary fibre (if choices are from legumes and oat fibre, for example).

Having studied each of these dietary constituents, the recommendation for adults over age 20 who are concerned about heart health suggest the following dietary outline:

RISK FACTOR CHECKLIST

	I'M OK	I CAN ADAPT	PROBLEM AREA
Desirable effects on heart health			
Healthy weight / BMI *			
Regular choice of: **monounsaturated fatty acids** (like in canola and olive oil) instead of peanut or coconut oil for salad dressing, for instance.			
: **dietary fibre** from raw fruits and vegetables, whole grains, oat bran, beans, peas, and lentils			
: lean meats; fish at least 3x/week; 3 eggs /week.			
: soft margarines and oils made from sunflower, safflower, corn, and soybean, the **polyunsaturated oils**, or discreet use of butter.			
: skim/1% milk and dairy products such as yogurt and cheeses			
Salt use limited to cooking, not at the table.			
Regular daily exercise including activities to increase heart rate eg., brisk walk.			
Undesirable effects on heart health			
Overweight; waist to hip ratio greater than 1♂, 0.8♀*			
Consumption of: saturated fat as more than 10% of daily energy+			
: total fat as more than 25-30% of daily energy +			
Consistent, repeated Clinical test results showing blood cholesterol > 6.2 mmol/l (240 mg/dl) and/or LDL cholesterol > 4.2 mol/l (160 mg/d)			

* Macdonald Journal, February 1988; BMI = body mass index = $\frac{\text{weight (kg)}}{\text{height (m}^2\text{)}}$
The least risk level is to have a value between 20-25 kg/m².

+Can be evaluated by a "food diary;" consult the dietitian at your CLSC, a hospital clinic, or in private practice.

Dietary Constituent	Recommended Amount
Total fat	Less than 30% of energy
saturated	Less than 10% of energy
polysaturated	Up to 10% of energy
monounsaturated	10-15% of energy
Cholesterol	Less than 300 mg/day
Carbohydrates	50-60% of energy
Protein	10-20% of energy
Total energy	To achieve or maintain a desirable BMI

So what does this mean in everyday food terminology?

Step up your intake of fish, skinless chicken, whole grain breads and cereals, fruits and vegetables, and beans (kidney, chickpeas, lentils, navy beans). This steps up your carbohydrate and fibre intake while stepping down your saturated fat and protein intake.

Cut down on foods that are high in cholesterol and saturated fat (including palm and coconut oils so often found in baked goods and snack foods). Try polyunsaturated vegetable oils such as safflower, corn, sunflower, and soybean oils (and margarines made with these), and the monounsaturated olive and canola oils.

Switch to skim or 1% milk, clear versus cream soups, water versus oil packed tuna and salmon, rice and pasta and low fat cheeses. Indulgences that are high in saturated fat and cholesterol can be consumed less often (1-2 X/month): sour cream, spareribs, hot dogs, fried fish, croissants, gravy, ice cream, potato chips, granola, bacon, duck and goose.

Keep your grocery list or favourite restaurant menu on the refrigerator, and when you use it think lean - and adjust to heart health servings for your meals:

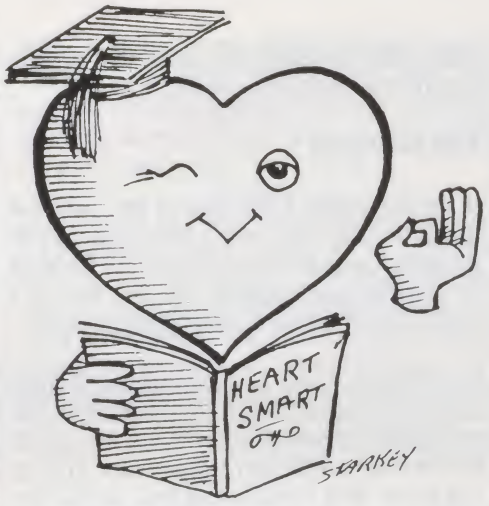

Illustration by John Starkey

LEAN meat, fish, and poultry
4-6 oz/day (3 eggs/week)

LOW FAT milk and dairy products
2 servings/day of 250ml or 30g

FRESH fruits and vegetables
2-4 fruits & 3-5 vegetables of 125ml or 1 medium-sized whole food choice

HIGH CARBOHYDRATE breads, pasta, cereals, and beans
6-11 servings/day; try vegetarian-like casseroles and pasta dishes (1 serving = 1 slice or 125 ml)

LIMITED USE OF RECOMMENDED FATS, oils, and salad dressings
As energy needs allow

TASTY snacks like sherbet, frozen low fat yogurt, angel food cake, gingersnaps, plain popcorn, popsicles
As treats

"Now and then" foods such as pizza, muffins, guacamole, nuts, and seeds can still be enjoyed - now and then!
February is heart month. Watch for activities in your community that focus on the HEART SMART program. Enjoy your meals and a healthy heart!

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Memorial Award

A Memorial Award has been established in memory of Sandra Letendre who was tragically killed in a car accident on January 2, 1988, in the Eastern Townships. Sandra's involvement with Macdonald College began in the mid 70s when she visited her brother Glen, BSc(Agr)'77, MSc(Agr)'82, while he was a student here. Her sister Sharon works in the Registrar's office. Sandra graduated in 1981 from Concordia with a BA in Graphic Arts. Her artistic talents were in great demand by individuals and departments at Macdonald and her work apppeared in many publications including The Macdonald Journal. She is possibly best known for her illustrations in Dr. David Bird's book "City Critters." Anna Whitton, a former student at Macdonald, hosted an evening for old friends in the Centennial Centre during Reunion Weekend and proceeds from the event went to the Sandra Letendre Memorial Award fund. The Award will be given on an annual basis to a deserving undergraduate student most clearly representing Sandra's characteristics. Preference is given to graduates from John Abbott College currently in Wildlife studies.

Fun Fact Fable Fiction

by Ralph H. Estey
Emeritus Professor
Department of Plant Science

Women Horticulturists

Taking the Bible as an authoritative source we learn that horticulture was the earliest profession and that the first association of Horticulturists was in Eden. After a brief interval of male domination, the only known period of complete male domination (because there were no women), the membership doubled and for awhile half of them were women, one of each sex. All went well with that early association until harvest time when a major difficulty arose, due largely to the woman member. It was not that she harvested carelessly or unskillfully, she simply took fruit from the wrong tree and quickly marketed it to a gullible male consumer. Again according to the Bible, men and women continue to suffer because that early harvest and marketing problem was not handled according to the rules of a higher authority.

Live and Learn

When ordering new siding for our old farmhouse in New Brunswick recently I was reminded of a joke that I once thought was humorous. It went something like this: A master carpenter seeing his apprentice throwing away nearly half of the nails he should have been using to apply siding to a house asked why so many nails were being discarded. "Their heads are on the wrong end," replied the apprentice. "You idiot," said the carpenter, "those are for the other side of the house."

They've Heard It Before

No wonder Maritimers haven't become excited over the prospect of a highway linking Prince Edward Island with the mainland. Their interest was aroused in 1891 by Mr. Francis Bain's series of lectures on "The Proposed Subway Between the Island and the Mainland" but it soon waned when, over the years, nothing but periodically renewed promises came of it. They also remember the many promises, and surveys, for a canal across the Isthmus of Chignecto, separating New Brunswick and Nova Scotia, that were made by many politicians over many decades, prior to many elections, that remain unfulfilled, but not forgotten.

Fact Explained

In the November 1988 issue of the Journal it was stated that there was a time when half of the school population of elementary students in Canada were negroes and that this fact would be explained in the following issue.

In 1632 Rev. Father Le Jeune opened the first school in Canada in the tiny settlement that eventually became Quebec City. He began by teaching only two children how to read and write. One of those children, or half the school population, was a black child.

A Vexing Question

Why do an increasing number of Canadians pronounce kilometre incorrectly? When the ending is pronounced the same as the ending in micrometre, thermometer, barometer, etc., it means a measuring device; in this instance, one that measures metres by the thousand, as does the one on the instrument panel of an automobile. When kilometre is pronounced as kill-o-metre it means a distance of one thousand metres. The difference in pronunciation changes the meaning of the word.

Drink Moderately

People who drink decaffeinated coffee, to avoid the real or imagined harmful effects produced by caffeine, may be ingesting potentially harmful amounts of methylene chloride, the chemical that has been used by some companies to remove caffeine from coffee beans.

Higher in Canada?

The results of a survey, carried out for the magazine Women's World, revealed that 60 per cent of all quarrels between husbands and wives in Britain are initiated by the women. It's probably higher in Canada, and when my wife reads this the percentage will go up another fraction.

Fable Within a Fable

In Greek mythology the seven daughters of Atlas were constantly pursued by Orion. But, according to the story, he couldn't catch any of them. Nevertheless, he continued the chase until Zeus took pity on the girls and placed them in the heavens as stars - the Pleiades. However, another fable about the seven sisters, while they were still on earth, tells of one becoming the mother of Hermes and another the mother of Dardanus, the founder of the Trojan race. If Orion didn't catch any of the sisters who did? Perhaps the story of their motherhood is just a fable within a fable.

Not Worth The Trip

He: Come into the garden with me.

She: Not at night without a chaperone.

He: But we won't need one.

She: Then I don't want to go.

High Priced Manure

In 1847 a ton of guano (bird manure) was selling at a higher price than a ton of wheat, in Montreal.
Trans. Lower Can. Agric. Soc., Jan. 1848, p. 19.

Well Defined

When asked to define "agriculture," 10-year-old Jimmie replied, "Agriculture is very much like farming, only farming is doing it."

Fungus Fact

The mystery surrounding several unusual deaths, suggestive of arsenic poisoning over a period of time, in one room of a house in Wales, was solved when a careful investigation revealed that the culprit was a fungus. The fungus, in growing on the green wallpaper in the death room, had converted arsenic in the green pigment to the toxic and volatile trimethylarsine and so "murdered" several of the people who had lived there.

Seeking Solutions

The Fall Semester: Grant Deadlines!

by Dr. R. K. Stewart
Associate Dean, Research

Oops! Another deadline come and gone and poor Hazel Clarke chasing me around the corridors looking for this article to edit. Actually I am writing this during the Christmas break while waiting for enough snow for cross country skiing. Just maybe Hazel will accept it when we get back in January.

Where did the term go I ask? Ask any professor at Macdonald and you will be given the answer "writing grant applications."

Our responsibilities as university professors are specified as teaching and carrying out research, and the majority of us do this with enjoyment and, we hope, reasonable efficiency. Unfortunately, carrying out these responsibilities requires that we obtain funding from outside the university for support of research. The university supplies the "bare bones" of space and basic equipment, but research costs must be supported from outside. It is the responsibility of the individual professor to get the funding and "there's the rub."

There are several granting agencies that we in the faculty look upon as our major sources of funding, namely the National Science and Engineering Research Council, the Conseil des Rescherches en Pêche et Agro-Alimentaire du Quebec and Fonds pour la Formation de Chercheurs et l'Aide à la Recherche. In addition to these major sources of funds we have a fair number of other agencies that we must apply to for support.

To get to the point of my story, most professors have to spend a great deal of time preparing grant applications, revising them, and getting them steered through the university and granting agency system. Although preparations may begin many months ahead, a lot of the agency deadlines fall around about the end of the calendar year. This combined with end of term exams means that the photocopying machines get overloaded, secretaries are badgered terribly, and professors suddenly rearrange all their priorities around meeting the dreaded "grant deadlines."

Seriously though, there is a definite danger of professors spending inordinate amounts of time in efforts to obtain research funding rather than doing the actual research work. Young professors particularly may be stressed by the preparation of new teaching materials as well as finding their way around the grants labyrinth.

In a climate of more researchers competing for declining funds (in real terms), quality applications are essential. Each application to the major agencies is thoroughly evaluated by committees of our peers as well as by others before funds are allocated. Many applications are unsuccessful, not due to a lack of scientific or social merit, but just due to an absolute paucity of research funds. The review process takes several months and after the flurry of application activity in the fall semester, the professor sits biting fingernails and hoping for a favourable result for the application in the spring. Come to think of it, we don't even have time to sit and bite our nails; we're too busy catching up on all the other jobs that should have been done while we were working on the grant applications. Like writing "Seeking Solutions!"

Reunion '88

"Above you all we ride in state A-G-R-I-C-U-L-T-U-R-E '38"

Reflections on a 50th Anniversary Reunion

Thirty-four graduates of the Class of '38 are still on record with the Graduates' Society. The following attended the Reunion on October 1, 1988; six of them with their spouses:

Marjorie Abel (Mitchell), Oakville, Ont.
Al Blenkhorn, Port Carling, Ont.
Frances Blenkhorn (Graham), Port Carling, Ont.
Eric Burnell-Jones, Dunany, Que.
Don Hamilton, Ottawa, Ont.
Roberta Kinnear (Robertson), Toronto, Ont.
Edith Marshall (Shaw), Halifax, N.S.
Marg Martin (Armitage), Penetanguishene, Ont.
Betty McDonald (Seifert), Ottawa, Ont.
Norman (Joey) Pope, Victoria, B.C.
Katharine Robertson (Munn), N.S.W., Australia
Donald Stewart, Charlottetown, P.E.I.

The Macdonald buildings, as we knew them, are now leased to John Abbott College CEGEP and today's Faculty of Agriculture and School of Dietetics and Human Nutrition - Household Science in our day - are housed in relatively new buildings. This physical change is, perhaps, the most striking reaction which you experience as you walk around the campus after 50 years.

Included in the new facilities is the Library, occupying two floors with computerized record-keeping. The present facility is a far cry from the limited book shelves and tables in the old Main Building where we used to study for exams and, sometimes when under less pressure, meet friends for a clandestine tête à tête.

The enlarged student enrollment has made some changes in campus life. You have the impression it is not as close as it used to be, and several of the extra curricular activities have been curtailed; no Literary and Debating Society, no live theatre, and no Green and Gold Revue. We felt some disappointment to hear of this change as we always felt these activities contributed to maturity of character and the development of good personal relationships for the years ahead. However, the pride and spirit of Macdonald appears as high as ever and was very evident at the day's main event, the Luncheon. At this Luncheon, Katherine Robertson, BHS '38, won a silver cup for having travelled furthest (N.S.W., Australia) and the combined Class of '38 won the silver cup for the most senior class represented. As well, we each received a 50-year gold lapel pin.

After lunch some of us toured the new buildings and in late afternoon we attended a reception give by Vice-Principal Dr. Roger Buckland. At this event we were especially delighted to meet again with Professors Bill and Laura Rowles, retired, but still going strong after all these years. During the afternoon, some of the girls met with Helen Neilson, Class of '39, now retired and writing the college's history after heading the School of Food Science for many years following her graduation.

In the evening, 16 of us met for a private dinner in Ste. Anne de Bellevue (vastly changed from the small village we knew), where we discussed our "50th Anniversary gift" - a donation to the Library - and where we were able to pass on congratulatory messages received from some of those who were unable to attend:

Ted Bain, Ottawa, Ont.
Shirl Griffin, Dorval, Que.
Gordon Stewart, Fort Lauderdale, Florida
Barbara Ames (Fletcher), Cumbria, England
Anna Jetter (Rosborough), Vancouver, B.C.
Ingrid Payan (Wilen), St. Hilaire, Que.

Douglas Pashleigh, r, Past AMF Chairman, congratulates Eric Burnell-Jones, BSc(Agr)'38 on the Class of '38 Reunion Gift Project.

As might be expected, the informal atmosphere of this event was spiced with a few nostalgic anecdotes and some personal comments over the ravages of time, all in good fun.

Overall, it was an interesting exercise to review what has happened since we left our close little private world of "Mac" - the big step into the competitive business world; the hardships, heartaches, and anxieties of serving in the second world war; the vast developments in science that have occurred in our lifetime.

As you walk around the campus thinking of these and many other changes that have shaped our lives, you say to yourself, "This is where I started. 'Mac' is still going strong. It was a good four years."

Eric Burnell-Jones
Chairman, Class of '38

Toast to Macdonald College

It is a privilege and an honour to be asked to pose a "toast" to Macdonald College. Yes, we are privileged in Canada to have the kind of education program that has been available to us. Here at Macdonald we had three additional privileges as students:

1. We were fortunate to have relatively small classes in a relatively small faculty so our opportunity to make lasting friendships was a bonus.

2. With small classes, we were privileged to have very personalized attention from faculty members. Where else could you find students knowing their professors as Pop and Mom Rowles? (with whom we had coffee earlier today.) Or where would you get the dedication and leadership of Helen Neilson or Lew Lloyd? Privileged indeed!

3. With the foregoing came the unique relationships that encourage the highest quality standards in professors and students alike.

This is the 30th Reunion of the Class of '58, and it is fair to say that over the past years we have seen changes here at Macdonald that changed things dramatically and we were not very happy. Yes, our "hope" changed to "despair" for our old Alma Mater.

Politics and Agricultural Economics! Guy Jacobs, BSc(Agr)'63, sous-ministre adjoint de la production et des affaires regionales au Ministère de l'agriculture, des pêcheries et alimentation and Garth Coffin, BSc(Agr)'62, Chairman of the Department of Agricultural Economics.

George Archibald, B.Sc. (Ag) '68, with his recent purchase from Robbers' Roost. In January 1989 George was appointed the Minister of Agriculture and Marketing in the Nova Scotia government.

This weekend as we gathered several of our class noted that the campus was looking better, that a new spirit seemed to be evident here at Macdonald. Our "Hope to Despair" has changed again to Hope! Change is in the air!

There is a formula for change that goes like this:

C = D x V x F

Change = Dissatisfaction x Tangible Vision x Logical First Step

It is evident that many of us have had this dissatisfaction with the status and state of Macdonald. Many of us left it there but, fortunately, some did not. Some developed a vision for this old college that has given new hope - evident even to those of us who only visit here every five years.

We congratulate the visionaries. We applaud the first steps taken and for the new hope that is abundantly evident.

As I ask you to rise and toast Macdonald, I know you join me in wishing Dean Buckland and his staff continued success in keeping the vision of Macdonald foremost in their activities. Roger Buckland, we salute your leadership. May it continue to furnish the vision and provide the hope to this great institution so its leadership will continue long into the future.

Continued success to Macdonald!

Bryon E. Beeler,
Class of '58

Beyond These Gates

Profile: Jacques van Pelt Lives As Some May Only Dream

by Hazel M. Clarke

It's a long way from Macdonald College to Fort Smith in the Northwest Territories; it's even further away from his native Holland, but for Jacques van Pelt Fort Smith and the surrounding countryside have all the elements that dreams are made of. A dream vacation for some is a way of life for Jacques, who combines business with pleasure as the owner of Subarctic Wilderness Adventures Ltd.,

Jacques received a Diploma in Physical Education at Macdonald College in 1959, then went to the downtown campus of McGill where he received a BEd in Physical Education in 1961. Jean McHarg, President of the Macdonald Branch of the McGill Graduates' Society read about him in an issue of Up Here: Life in Canada's North, and it has been through that publication, an issue of the Slave River Journal, and correspondence with Jacques that we have been able to catch up with this man, his philosophy, and his life style.

Jacques van Pelt at home "where silence, serenity and solitude reign..."

Fort Smith, a Northwest Territories-Alberta border town is some 870 miles north of Edmonton. Wood Buffalo National Park, which is the second largest national park in the world, was established in 1922 to protect the last remaining herd of wood buffalo, a larger northern relative of the plains bison. Jacques van Pelt told writer- photographer Lyn Hancock in the September 1985 Up Here article that there were 17,000 bison when he first went to Fort Smith nearly 25 years ago. That number in 1985 was down to about 6,000 because of disease, flooding from incompetent damming, and poaching.

Jacques first worked for the territorial government; he was their first employee to build his own home. In 1980, according to the Slave River Journal, he became the first private guiding company outfitter to be given a license to conduct package tours of areas in the Wood Buffalo National Park. His first winter bush dog-sledding guests were from Saudi Arabia and New Hampshire.

Jacques van Pelt or, as he is known in the North, "Jacques Rabbit van Pelican Pelt," is an avid outdoorsman and naturalist and probably owns the only guiding company in the North that operates all year: Subarctic Wilderness Adventures. The Journal article went on to explain that Jacques had explored much of the wilderness of northern Wood Buffalo and parts of the Tazin Highlands to the east of Slave River.

The Pelican part of his name comes from the fact that for years he has monitored the world's northernmost white pelican rookery on islands in the Slave River Rapids. He monitors the colony's population and productivity for various agencies and said that there were 20 to 40 pairs in the 60s and 70s. Now there are about 125 pairs coming to nest annually. They migrate from Guatemala - New Mexico.

Whatever the season, Jacques is equally at home on skis, snowshoes, dog sled, canoe, raft, or kayak and, therefore, may offer tours at any time of the year. Individuals who wish to venture forth on their own may consult with and rent from Jacques, or packaged tours for small groups can be arranged. Guests may sleep under canvas (tent, teepee) or under the stars, fish, walk or drive a dog team. For guests who don't bring their own gear, Jacques is equipped to rent anything from teepees and tents, to canoes, kayaks, dog packs, mukluks or touques.

Jacques said of the Park shortly after he acquired his license, "This is pristine back country....where silence, serenity and solitude reign, where wilderness speaks for itself." Lyn Hancock caught that feeling, "We breakfasted by a beaver lodge and knew ourselves privileged."

Lyn Hancock writes in the Up Here article, "You know there's something special about Jacques and his trips when he picks you up at the airport. A smiling Dutchman with pixie ears and a ready smile, he'll likely be wearing baggy blue pants and wooden clogs in summer, a buffalo robe and mukluks in winter." "He's one of those rare human beings" a guest told Lyn, "in whom all segments of personality are at peace and who lives solely for the purpose of conveying that peace to others. He has a graciousness, a nobility of manner you don't often find."

In turn, Jacques told Lyn that what he liked doing most was planning trips for people either in small groups or alone so that they have a personal relationship with the wilderness."

Subarctic Wilderness Adventures Ltd.
Box 685, Fort Smith
Northwest Territories
Canada X0E 0P0

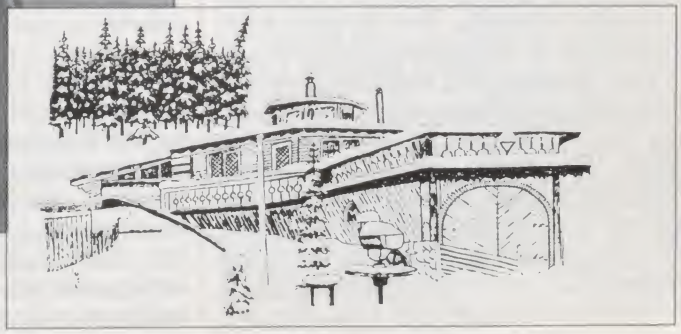
Jacques van Pelt's individualistic style doesn't stop with his way of life: it extends or possibly starts with the Fort Smith home of Jacques, his wife Ruth and daughters Lisa, Lora, and Karla. Up Here's April/May 1986 article "Round and Friendly" features the home which is a two-storey octagonal structure topped by a smaller octagon that a friend of the family's once likened to a pregnant ink bottle. Jacques told author Ian Stalker that from reading and visiting aboriginal people he learned that a circular home is a lot more human...a square house is like living in a box.

The house is 1,400 square feet and has a full basement dug into Axe Handle Hill, which is used for underground storage for his camping equipment and food supplies. There are nine rooms and the small octagonal glass-sided room. Three barns are built below ground level and are connected to the house and each other by tunnels. Fans suck heat into the barns from the house. One of the barns was used for chickens; the other had been used for raising rabbits - the "rabbit" in his northern name - but Jacques Rabbit van Pelican Pelt put his rabbits on an island in the Slave River. As he told Lyn Hancock: "Chores are easier that way. The rabbits burrow into the ground to keep warm in the winter." There is willow feed on the island and shelter from birds of prey and, as the island is surrounded by white water, people are not a problem. He harvests the rabbits twice a year and uses the whole animal: meat for food, entails for dog food, the various other parts for slipper tops, hats, sleeping bags, and good luck charms.

Cooking under a rainbow by the Great Slave River.

The house, which is built of knotty pine and knotty cedar logs, is set partly in a hill allowing Jacques quick and easy access to ski trails behind. There are other houses in the area and, interestingly enough, Macdonald graduate Bob, BSc(Agr)'56, and Sheila Shone live right across the road. They are teachers now at the local high school and Thebacha College.

There is little doubt that any one arriving in Fort Smith for a Wilderness Adventure or senior-oriented touring would be greeted by warmth and friendliness. We'd like to sum up this Mac graduate's profile with comments he made to Lyn Hancock when he compared his lifestyle to the Slave River which obviously plays a large role in his life. "I work very hard in short spurts in summer, then I calm down in winter to do some teaching, some writing, some guiding. I change with the river. If the Slave were only rapids to raft, it would be just another hectic North American experience. But it has a beautiful rhythm: lively waters in the 'fast lanes,' then quiet pools, cooperative free play with the rapids and then leisurely drifting. In between the turbulence you have time to think about what you have been and are hoping to do with your life."



Jacques built a circular home that he says is much more human than a square one.

FOCUS Environment

We've Come a Long Way

by Professor J.R. Bider
Wildlife Ecologist
Department of Renewable Resources

Planet of the Year — Endangered Earth — What on EARTH are We Doing? — these were the cover stories and headlines of this year's first issue of TIME magazine. Devastation of the Brazilian Amazon forest, floods, drought, dying seals along the European Coast, endangered species, the problems of energy consumption, global warming, overpopulation, and waste were a mere sampling of the ever increasing number of problems which were reported to beset this planet of ours. To the question, "Is there any hope?" I put forth one answer, "change," but this will take time, patience, persistence, and funding.

Developing a better understanding today for a better environment tomorrow. Catherine Rankin, showing Valerie Heath, Bsc(Agr)'81, and her son Patrick a garter snake.

Professor Roger Bider and fisheries and wildlife management class at wildlife field station at Lac Carré, Que.

There seems to be two key elements to change. The first is that change is initiated by the individual; however, nothing will happen unless the second key element, the timing is right. Many people get bright ideas and, fortunately, the same ideas keep resurfacing until one day the timing is right and the idea takes off. Thus, time, timing, and relative speed are the crux of our existence. When I finished my university studies and was ready to "become productive," there was, in the Province of Quebec, one practicing Mammologist, one private Environmental Consultant in lake management, and one job opening at Macdonald College which included the task of teaching a course in Conservation. A most gracious McGill alumnus, Mrs. Arthur Henderson, who had the idea of doing something about conservation in this province, had provided start-up funds to the Faculty of Agriculture. It was 1965 and my inadvertent timing was right; I got that job at Mac.

Man's first consideration is egocentric which is not surprising as it relates to survival in an evolutionary process. Thus the more ideas which result in making man's existence easier now, the faster they reach acceptance in the population and become part of our brave new world. The process of acceptance is simple. First, the idea is developed. Second, the person with the idea needs to convince only one other person, the entrepreneur, who has a vast assemblage of tools to get the idea integrated into our customs and way of life. If the implementation of these ideas have unpredicted side effects, the process of reversing acceptance is monumentally difficult, because offsetting forces are continuously evolving. One which depends on the acceptance of an instantaneous timely thought, the other which must follow at some later date, depends on the effect of the new force. The counteraction, unfortunately, is much more complex.

To counteract a situation which has popular acceptance is difficult. First someone has to get the idea that things are not quite right because of some mental model or piece of evidence. Second, the concerned person must convince his peers that there is a problem. Third, someone must be able to bring the idea to the attention of the public. Fourth, a spokesman for a public group who does, or claims to, represent large segments of the society must take the problem to the government. Fifth, the government must weigh the issue not in terms of whether the idea is right or wrong but rather on how the population will feel about the change in policy. Sixth, the government ministries must attempt to develop new laws using all kinds of technical staff which range from scientists to lawyers. Seventh, the laws must go through readings and debates before being promulgated. Eighth, specific regulations must be developed for each ordinance. Ninth, money has to be found to enforce regulations because of the need to develop new enforcement agencies or offices. Tenth and finally, the government ministry must find a solution to mitigate the harm already done. At every step it takes a different kind of person to carry the concept

forward and each step seems to take an eternity.

Considering the difference in time it takes to create a problem and then to solve it, is there any future for this planet? What can we do? Believe it or not, I believe we have come a long way. I also believe that there is a glimmer of light at the end of the tunnel, and that we can save this fragile earth.

Consider that in 1949 summer students were overwhelmed over the lack of bird life in the DDT test plots north of Lake Superior and I, like many others, thought the birds were not there because they had gone on to feeding in other areas where food was more abundant. Consider that in 1952 I, as a sophomore in university, was offered a summer job by Agriculture Canada to be in charge of making sure DDT in the right concentrations got mixed in big barrels and loaded into the aircraft used in the battle of the budworm in northern New Brunswick. I wanted $240 rather than the $225 a month offered, based on what I considered my previous experience and the responsibility of the task. They, thank God, refused me.

Consider that Rachel Carson, scientist and writer, published "Silent Spring," her scathing condemnation of the use of DDT, in 1964. Consider that Macdonald College probably offered the first university level Conservation course in North America in 1965. Consider that it was in the summer of 1969, not 20 years ago, that the influential Time magazine added Environment to its weekly sections, thus giving Environmentalists one of their first potentially powerful media tools. Consider that it was in the late 60s and early 70s that the Science Council of Canada began looking at the Research and Development programs related to Canada's Renewable Resources. Consider that in the last 20 years we have gone from a handful to well over 250 environment clubs, associations, and societies in Quebec alone. Consider that Environment went from not newsworthy to big news. Consider that Ministries of the Environment date back less than 15 years and have gained tremendous prestige if one is to judge by the interministerial bickering and fights for the different sections of the environmental pie. Consider the increase in money available for environmental research over the past few years. Consider that now environmental impact assessments must be made before any major undertaking. Consider that corporations are now spending large sums of money on impact studies (Hydro Quebec's budget for 1988 alone was in excess of $16 million dollars). Consider that several recent poles have shown that environmental issues are the prime concern of the people of Canada, including Quebec. Progress is being made.

At this juncture in time I feel that university professors are the luckiest of all because they can intervene in environmental issues in a multitude of ways. Most important we are educating the people who will be responsible for looking at those new ideas that are being developed at an ecliptic rate and for assessing their impact. That is no light responsibility. We can also get involved in research which will develop monitoring systems to continually measure the status of our environment, develop techniques to restore habitats and populations, discover new ways of solving problems, or getting rid of waste in an environmentally safe way. But, this is not all we can do.

The key to a better environment lies in public attitudes. Too often in the past good decisions were made to respect the environment and hordes of money was spent to design things properly only to have a bulldozer driver on site make the irreversible and final decision. Public education in the broadest sense is the quintessence of conservation, and we can get involved in many ways. For instance, the popularity and impact of nature films can have an immeasurable impact for good on children and adults alike. When people see a frozen wood frog thaw out and walk away on television they are profoundly affected by the wonders of nature, and this increases their view of the worth of their environment. From then on it's all down hill, and we will catch up in time.

Continued from page 27

Agriculture and the University of Zimbabwe has been put into place which also involves programs in Animal and Plant Science. Short-term visits will continue to be made to Zimbabwe by the author and other Macdonald College staff including Professors Downey of Animal Science, Lawson of Plant Science, and R. Stewart, Associate Dean, Research. As well, visits to Canada will be made by University of Zimbabwe staff and there is a provision for post-graduate training to develop new staff for the University of Zimbabwe Faculty of Agriculture. As an example of additional contacts made through a project, the co-operation between Macdonald and the University of Zimbabwe has become known to other agencies in Zimbabwe. This has led to applications by students to study here with financial support completely independent of the CIDA-McGill-University of Zimbabwe cooperative project.

Other past and present involvement by Department of Agricultural Engineering staff in international activities include Professor Pierre Jutras (now a consultant) in Cuba, Jamaica, Senegal, and Gambia; Professor Alfred Marquis (now at Laval University) in several West African countries; Professor Chandra Madramootoo in St. Lucia; Professor Robert Kok in Nigeria, Senegal and Zambia, and Professor Vijaya Raghavan in India and Costa Rica. Altogether the interactions of staff with colleagues in foreign lands have added up to hundreds of contacts, a greatly improved exposure for Macdonald College and McGill University to the outside world, extensive international experience for the benefit of Canadian students and future cooperative projects, as well as a great number of new lifelong friends all over the world. And these contacts promise to be just the beginning as inquiries for international cooperation continue to be received and new projects are put into place.

Diploma Corner

Dips from '38 to '90 at Reunion

by Hazel M. Clarke

It was Saturday, October 1st, the start of a weekend and a day off for many with off-farm jobs so it was natural to see quite a number of familiar faces, but looking around at the large group of people who turned up for the Reunion, you just had to ask: "Who's at home doing the chores? It can't be that guy's dad because he's over there talking to a group of people, and it sure isn't his brother because he's at the barbecue getting a porkburger."

I may not know who did the chores, but I do know that 105 Diploma graduates signed the register and Diploma Association President Angus MacKinnon, Vice-President Neil Richardson, Association Board members, and Diploma Program Director Marcel Couture were very pleased with the turnout and the enthusiasm. This was the first Diploma Reunion to take place at the same time as the annual Reunion of the Macdonald Branch of the McGill Graduates' Society. The Diploma Association chose the arena on the college farm as the site for their Reunion. The weather cooperated beautifully for the outdoor socializing and barbecue and, with most Diploma grads having spent hours while at Macdonald in the arena showing cattle at the College Royal and Livestock Show, the location was a familiar setting for their indoor activities.

Enthusiasm was dampened somewhat in that more than the 105 were expected but either last minute chores, people forgetting to mark the calendar, or sickness brought the numbers down. It could be, too, that Class Reps were just a little too optimistic in the numbers they thought would come? The point is there was enthusiasm for a Reunion to take place, it did, a tradition has been established, and the future looks good for even better turnouts in the future, and, learning from experience, Class Reps will be on the phone shortly before this year's Reunion which will be on October 14th.

Clarence Stevenson, Class President, introduces the Dip '38 class and expresses their pleasure at being back at Macdonald.

Marcel Couture is particularly pleased with the way the younger Diploma grads have taken on the project of forming an association and of planning activities to get Dips together. The interest has now spead to some older graduates and to those students who are still here at Macdonald. The Dip IIs were asked if they would like to raise some funds by looking after food and refreshments for the Reunion. Their Class President Christopher Studer from St. Sebastien, was keen. "My class pulled together and they enjoyed it." Chris said he knew very little about the Association before Reunion. At a recent election of officers of the Association where Neil Richardson was elected President, Chris was elected Vice-President and the Member-at-Large is Hugh Maynard. Angus MacKinnon, who is now Past President, was asked to stay on as president for another term but asked to be relieved of his duties. Angus has become a Director of the Macdonald Branch of the McGill Graduates' Society.

Some other Dip graduates who attended the Reunion may not be as young in age but they certainly are young at heart and it was a particular pleasure to welcome Dip '38 men and their wives. After the official welcome by Dean Roger Buckland and a good-hearted display of woodsmenship by the Dean and Marc Côté of CBC Radio Noon, the Class of '38 were introduced and welcomed with a standing ovation. Their Class President Clarence Stevenson spoke on behalf of the class and then led them in a Dip '38 chant that received hearty applause.

At a recent meeting of the Association, plans were already being made for this coming October with emphasis on getting in touch with as many grads as possible, especially the 25th and 50th anniversary year classes. Dale Henderson, Dip '64, from Ormstown attended the meeting and will be in touch with fellow classmates. Keith Rose and Stuart Merrill will do the same for the Dip'39s. Members of these two special years will attend the graduates' luncheon and receive commemorative pins from Macdonald College. They will also get together with fellow Dips at the farm and later in the evening in the Centennial Centre. It's not too early to mark October 14 on your calendar and, if necessary, to line someone up to do chores that day!

The sawdust was flying as Dean Buckland and Marc Côté display their expertise with a cross cut saw!

Lost Dips

Marcel Couture said that a Directory is being compiled by the Macdonald Branch of the McGill Graduates' Society and it is hoped that the names and addresses of as many Diploma grads as possible may be included. In order to send you out Association news and information, Theresa Greene, Association Secretary, is looking for names and addresses of a number of Diploma graduates who have changed addresses since they left Macdonald. If you haven't been receiving information on the new Diploma Association or know someone else who hasn't, chances are the address isn't on file. Dale Henderson said he would need help in finding some Dip '64s and they are listed below. With this in mind we are starting a Lost Dip column on these pages. Please send names and address to Theresa Greene, Diploma in Agriculture Program, Box 204, Macdonald College, 21,111 Lakeshore Road, Ste. Anne de Bellevue, Que., H9X 1C0.

LOST DIPS

Dieter Bidner, Dip'64	Gordon Bustard, Dip'64
Bob Copstick, Dip'64	Dan Cowan, Dip'64
Anthony Johnson, Dip'64	Jim Mayhew, Dip'64
Steve O'Grady, Dip'64	Darnley Stuart, Dip'64
Roger Williams, Dip'64	Rolston Wong, Dip'64

Doug Carr, Dip'66

Assistant Director of the Diploma Program Serge Lussier, l, James Peel, Dip '82, and Theresa Greene, Assistant Director, Farm Practice, had a special warm welcome for Michael Oertle, Dip '82, who now lives in Switzerland and planned his holidays so that he could fly in for Reunion.

Happy 10th anniversary reunion to Dip '78s, Back row, l to r, Warren Smith, Brian Hoskins, Rob van der Star, Robbie Sutherland, Malcolm Sprague, Mike Labelle. Front row: Doug Morrison, John Rhicard, Robert Scullion, Janet Sparey, Hugh Maynard, and Christoper, future Dip 2008. At Reunion but missing from photo: David Kay, Peter Clark, Rita Alexis-Zimmermann, and John McGlashan.

Dip '80s catch up on the news, l to r, Rudi Erfle, Grant Baxter, Garry Hamilton, and Danny Booth.

Trinkie Coffin, BSc (HEc) '62, Homecoming Chairman for the Graduates' Society, greets Willard Greig, Dip '48, his wife, and Stewart Duncan, Dip '48, back to camera.

Macdonald Branch President Jean McHarg, BSc(HEc)'60, catches up on the news from Douglas MacKinnon, Dip '50.

The Quebec Women's Institutes

Scholastic Awards Banquet

The Scholastic Awards Banquet took place on November 3, 1988, in the Centennial Centre. I was privileged to represent Pearle Yates, our President, at this important and enjoyable event. The QWI awards were presented to three charming and interesting young people.

The Frederica Campbell MacFarlane award, in memory of that lady, on staff at Macdonald College and a Superintendent of QWI, is given to a student from rural Quebec who is in the School of Dietetics and Human Nutrition. The recipient this year was Lynn Connor, of Bromptonville, who is currently doing her stage at the Royal Victoria Hospital.

Mrs. Alfred Watt, MBE, a distinguished Canadian, introduced the idea of WI in England and Wales. She was the first president of ACWW at its formation in 1930 and held that office until 1947. A scholarship in her name is given to a student in the School of Dietetics and Human Nutrition who shows qualities of leadership. Victoria Carter, originally from British Columbia and now living in Quebec, received this award. She is doing her stage at the Montreal Rehabilitation Centre.

Bruno Breault, who grew up on the family farm in Rawdon is the recipient of this year's QWI bursary. In his second year of the Diploma in Agriculture Program, he would like to continue toward a degree. He has completed a Stage in Clarenceville, and may eventually join his brother who farms in the Iberville area.

These three young people were a pleasure to meet. They were interested in the work of QWI, both locally and abroad; they all have very different interests, and I very much enjoyed their company.

Alexandra Jenkins
QWI Secretary

In Sympathy

Members of the Quebec Women's Institutes extend sincere sympathy to Florence Ellerton, First Vice-President of the Quebec Women's Institutes, on the death of her husband, Gerald on November 25, 1988. Florence married Gerald in 1956. They lived in Hemmingford and had three daughters and one grandchild. Our sympathy to Florence and her family.

Provincial Publicity Chairman

Mrs. Barbara Norton Harvey has been appointed Provincial Publicity Chairman. County Coveners - please take note! Her address is 483 Childerhouse Rd., Dunham, Quebec, JOE 1MO, Tel. (514) 295-2348.

Barbara was born in Sutton, Quebec, in 1933 and during her young years lived in various parts of the Eastern Townships. She attended school in South Stukely, Bromptonville, Hatley, Ayer's Cliff, and Beebe. After school she worked as a telephone operator for Mansonville Utilities in Sutton and then for a short time as an assistant in Mme Chicoin's Beauty Salon in the same town. Then she met Junior Harvey, a farmer from Dunham, and they were married December 1, 1951. They have five children: three boys, Lloyd, Mark and Kevin, and two girls: Janice and Trudy.

Barbara and Junior live on a Century Farm in Dunham. It is a dairy farm in full production. Barbara is an active member of Dunham United Church. She is Secretary of Dunham United Church Women, Chairperson of the Manse Committee of the Sutton - Dunham Pastoral Charge as well as on the Ministry and Personnel Committee and Worship Committee. She has been a Women's Institute member for 28 years and has served many offices and convenerships at branch and county level. Barbara's hobbies are handicraft competitions (knitting, crocheting), playing piano, gardening, baking, watching television, and meeting people.

Semi-Annual Board Meeting

Some highlights of the Board Meeting held at the YWCA in Montreal in November. Our Safety Convener is June Kelly, 2nd Vice-President, and Elsie Prevost is looking for tips for her column in The Macdonald Journal. The Reflectors are selling well. We have QWI Pioneers, 25-year Histories, Seals, and FWIC Cookbooks for sale.

Doris Stevens, our Treasurer, reminded the Board members that fees must continue to come in and said the cookbooks are selling well.

Barbara Harvey is replacing Darleen Sabetta as Publicity Chairman. Darleen was thanked for her work for us in the past triennium. Counties should submit a report every month after their meetings.

Our Guest Speaker was Dr. Jacqueline Gerols, Associate Dean of Student Affairs at Macdonald College. She outlined the programs that are available to our young people here at the college and the wide range of options for careers in the agrifood system. Pamphlets were distributed to the Board members and a question period followed. A brief outline of her talk has been sent to your county representative, so ask to see it.

Gwen Parker chaired the discussion on constitutional changes. Some clauses have been reworded. The Constitution in its revised form will be sent to the branches after the February executive meeting. At the Board meeting in May, County Presidents must be prepared to present the changes to the Board for their approval. Lucy French thanked Gwen Parker for her wonderful work on behalf of QWI and made a presentation to her.

Jeannine Lussier is collecting recipes for our own QWI Cookbook. She would be glad to receive them from members.

Please note that the Provincial Office mailing address is a little longer: P.O. Box 58, Macdonald College, 21,111 Lakeshore Road, Ste. Anne de Bellevue, Quebec, H9X 1C0.

Alexandra Jenkins
QWI Secretary

EXPO QUEBEC

QWI President Pearle Yates enjoyed her first trip to Quebec City where she took part in the Awards reception hosted by the Ministère de l'Agriculture, des Pêcheries et Alimentation. She was very impressed by the quality of work. Other QWI members also visited EXPO-QUEBEC, including Elsie Prevost who reports that the winners from among WI entries were: Argenteuil, Joan Griffith for kimono and pullover; Baldwin Cartier, Sheila Washer, kimono, Ruth von Brentani, centrepiece; Chateauguay-Huntingdon, Anne Robertson, kimono, Darleen Sabetta, pullover; Gaspe, Stella Miller, kimono, Mary Baird, pullover; Montcalm, Nellie Jamieson, centrepiece; Richmond, Janine Sterl, pullover and centrepiece. Congratulations!

FWIC Board Meeting

During the FWIC Board meeting held in Toronto October 23-27 members took time out to visit the Adelaide Hoodless Hunter Home: it was my first visit. An FWIC research project to cover a two and a half year period will deal with child care. Convener's programs were submitted and discussed. Lucy French is the International Affairs Convener. Quebec is now twinned with New Brunswick. The 12th FWIC Convention will be held in Victoria, B.C. The theme for the ACWW Conference in Kansas City this year is "Partners in Progress." Each constitutional society is allowed five voting delegates and one alternative. There will be a regional mini ACWW Conference in Saskatchewan in 1990. Resolutions were submitted on the controversial drug Depo Prevera and on chemical hazards to farm families. FWIC was also asked to support two N.B. resolutions on rural mail and capital punishment. The FWIC Cookbook is selling well. The cookbook can be a money-maker for us - won't you help!

Pearle Yates
QWI President

Watching QWI President Pearle Yates cut Ormstown's 50th Anniversary cake were, l to r, branch president Shirley Carmichael, Pearle, QWI Past President, Lucy French, 1st Vice, Florence Ellerton, 2nd Vice, June Kelly, Treasurer, Doris Stevens, Secretary Alex Jenkins, and anniversary chairperson, Willa Hooker.

SAFETY FIRST

by Elsie Prevost

Spring cleaning will soon be here! Painting outside and inside the house necessitates the use of a ladder. Household extension and step ladders are tested for performance and strength. But the safe use of them is still up to the user. There are labels usually to be found on the inside rail of a ladder. These should be read carefully and used as quick reference for safe use.

Always be sure that an extension ladder is right side up. Set the ladder at a safe angle. If it's too close to the wall, the ladder could fall; if set too far away, it could slip out or break under the strain. Secure the footing properly. Always open a step ladder fully and make sure it is stable before climbing it. Never stand on the top of a step ladder and never overreach.

Ormstown WI Entertains

It has been a tradition since the branch was formed that the local school staff be entertained each year at a tea given by the Ormstown WI. The tea on November 1, 1988 was very special: it was the 50th anniversary of Ormstown WI and 140 guests were present. As well as present teachers and staff from Ormstown Elementary, former teachers were also invited and 11 were present, including one from Maxwell, Ontario. Also invited were local community leaders, WI members from the other branches in the county, local candidates in the up-coming federal election, the editor of The Macdonald Journal, and the provincial executive. It was the first time that all members of the provincial executive had been able to attend a function. Guests enjoyed a social hour, and an opportunity to view interesting displays of handicrafts and other QWI activities before sitting down to a delightful tea with a special cake cut by QWI President, Pearle Yates. Pearle extended best wishes as did County President Carol Petch.

With the Branches

ARGENTEUIL: Jerusalem-Bethany A student, Janet Parker of Carleton University told of her trip to Greece and the adventures she experienced on an archeology "dig," looking for pottery buried 2000 years ago. **Frontier** donated to Meals on Wheels, held an auction of garden produce, 19 members and two visitors attended their meeting. **Grenville** learned from the Citizenship Convener that Hawksbury has a place for recycling bottles, cans, and newspapers. Several **Pioneer** members, past members, and friends met for a luncheon following a social afternoon at Mrs. S. Armstrong's when their County President Joan Griffith spoke on the various changes on the Provincial Executive as well as other items of interest. They also viewed some momentoes from FWIC Convention. **Lakefield** WI welcomed a new member, Corinne Connolly. **Arundel** members visited three "over 88 group" who were celebrating birthdays. World Food Day was acknowledged with donations to the Children's Home in Rosemere. Proceeds from card party went to ACWW.

West Island WI make it possible for Santa to give out 52 reflectors to intellectually handicapped adults at an Outreach Christmas party held at the Summerlea United Church in Lachine for group homes.

Ormstown WI, back row, l to r, Joan Gosnell, Shirley Carmichael. Gladys Clark, Gerry Pilon, Joan McEwen, Arlene Cottingham, Alice English, Mary McGerrigle, Doris Laverty, Ruth Towns, Willa Hooker. Seated: Margaret Graham, Edith Harvey, Lena Spedding, Hazel Bradley, Hazel Ness, Virginia Faloon, Margaret McBain, Connie Black.

BONAVENTURE: Black Cape had 14 members and three guests; The Black Cape Bursary was won by Sharon Pidgeon, Bonaventure School, and Mitzi McKinnon won the Book Award from Richmond High. **Grand Cascapedia** handed out recipes for diabetics and fund-raising plans were Rummage Sale and a Sunday Brunch. **Marcil** WI welcomed Beth Larocque as a new member and heard reports of the Shigawake Fair. 31 students exhibited at a very successful School Fair.

BROME: The theme of their Semi-Annual was "Hallowe'en." Prizes went to Betty Needham for her witch costume and to Betty Telford dressed as a pumpkin. Evelyn Jackson took the prize for her wall hanging in the "decorations" class. Pearle Yates, QWI President donned her Auctioneer's Hat for their auction of various items. **Austin** Sent October tea money to WI Extension Fund; held a demonstration on the art of plastic canvas needlepoint, roll call answered to "Where did the Summer go?" Betty Telford's poem to this was greatly enjoyed.

CHATEAUGUAY-HUNTINGDON: Hemmingford WI took second place in Huntingdon Fair Competition. Coveners all had interesting reports. International Affairs convener had Karl Johansen of Ottawa as guest speaker. Karl (who is a brother of Anne Robertson's) worked for CIDA and was a Canadian High Commissioner in Africa before retiring. He also showed slides and gave information on Canadian work in Africa. Congratulations to Esther Cavanaugh, lst vice president of the county, who recently became an official new Canadian.

COMPTON celebrated their 75th anniversary at a banquet in Sawyerville Community Centre, August 31st. Special guests included the WI Executive and presidents from two counties. Lavina French related many acts and deeds of efforts of the WI in a historical poem she had composed. Mrs. Vera Todd spoke of her trip on the Kenya Safari. At their County meeting held in East Clifton, "The Walter Hodgeman Memorial Bursary" was established for Agricultural students, or students continuing their education to work in the rural sector. They also held a card party and a supper. **East Clifton** held a Lawn Sale and were hostesses for the County meeting. Bury held a spelling bee. **Sawyerville** donated to CNIB and entertained the County members.

GATINEAU: Wright WI recently had a couple of interesting mottos: "You know you are getting old when your back goes out more

often than you do," and "If you look like your passport photo, you need the trip."

MEGANTIC: Kinnear's Mills members donated to the Terry Fox Run. Congratulations to Andrea Nugent, granddaughter of former member Gladys Nugent who won a bronze medal at the Olympics. Welcomed Janie Marshall as a new member. **Inverness** members served tea to the residents at the Wales Home to commemorate World Food Day.

MISSISQUOI: Presented their first bursary at their Semi-Annual Convention held in Stanbridge East The recipient was Trudy Harvey, daughter of Dunham member, Barbara Harvey. Members of the Provincial Executive and Austin WI were welcomed at this meeting. A substantial sum was realized from the auction towards keeping the Bursary Fund active. A successful Salad and Dessert Luncheon and Card Party was held. **Dunham** presented book prizes to Elementary School; planted flowers around the Cairn; and Pearle Yates worked on an open hearth, using iron pots, etc., making bread and doughnuts on Pioneer Day in Philipsburg. Members visited County Museum, and Pearle Yates and Barbara Harvey attended Expo-Quebec. **Fordyce** had two guest speakers: the owner of Printed Paper Products, who spoke on its history and the Manager of the Town of Cowansville. Took a trip to Granby Zoo; entertained Rawdon and Cowansville branches and gave prizes for best improvement in French and English in levels 5 and 6. **Stanbridge East** "The History of Chocolate" was the topic for Dr. Bruce Baker's talk and slide presentation and members sampled a lot of goodies.

RICHMOND: Cleveland Dolly Soan received a 50-year pin; members visited the Darcy Barn of Antiques in Richmond and had a demonstration with Alice Mellish and the Rainbow Cloggers; prizes were given to Youth Fair winners. **Richmond Young Women** gave trophies to Youth Fair and the children's section of the Plowing Match; donated to Student Loan Fund; viewed a video and had a talk by Mary Mitchell of CLSC on Prevention of Sexual Abuse of Children. **Gore** presented Julia Griffith with a 25-year pin; held card parties and a garage sale.

Ruby Moores, a long-time WI member in Missisquoi County receives an Abbie Pritchard Throw from QWI President Pearle Yates.

SHERBROOKE: All branches supported a successful School Fair (BRAVO members!!) - 122 students participated and over 100 parents and friends attended the prize-giving. Branches support the CBC "Wool Gathering" Project. World Food Day was acknowledged from learning the history of pasta to comparing our easily accessible food supply to that compared from samples of food made from the mandioc root to an auction of home-baking. **Lennoxville** donated the proceeds from the "Food for the Hungry Table" at their Bazaar to the ACWW Nutrition-Education Fund. Their roll call to "name a woman entrepreneur" showed the number there are in the area; they, as well as Belvidere branch packaged cancer dressings. **Belvidere** and **Milby** donated to the ACWW Nutrition Fund. Milby invited the conveners of Canadian Industries from Stanstead County to a meeting.

STANSTEAD: Ayer's Cliff presented pen sets to two students for Penmanship in the Primary School in memory of Louise Robinson and Jessye Pierce. **Hatley** Prizes were given to two young people who grew gardens from seeds furnished by WI. **Stanstead North** WI celebrated their 60th Anniversary. Special guest was Mrs. Frances Taylor, who celebrated her 95th birthday. Mrs. Taylor has served on four levels of the WI; 25-year pins were presented to Rheta Taylor, Doris Gibson, Ruby Simpson, and Sybil Labaree. Miriam Osborne, a member for 58 years, cut the Anniversary cake.

In reading the reports I have received, I have had only one County mention the "Wool Gathering" project that CBC is giving us so much publicity on. In your reports to me, I would like to hear more from you about what your Branches/County are doing. On Monday, November 28th, our QWI President, Pearle Yates, was on CBC radio discussing it, but I presume at 6:45 a.m., it was too early for most to hear it. Sorry I missed it, too, Pearle!

Barbara E. Harvey
QWI Publicity

Dolly Sloane, a member of the Cleveland WI, receives her 50-year pin from County President Murriel Duffy.

Newsmakers

On Campus

The following is a brief statement by Professor Block on recent discussions on the use of bovine somatotropin.

Recently there have been a few articles appearing in the press that give bovine somatotropin (BST) a tainted image and that appear to be written to "scare up" some public interest. In fact, in British Columbia, Alberta, and Ontario milk harvested from cows treated with BST must be dumped.

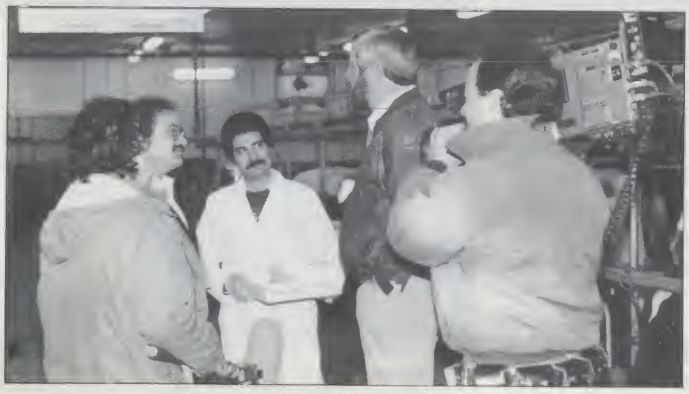
For those of you unfamiliar with BST, it is a protein hormone that is normally produced by cows. When a supplemental injection is given to cows they produce up to 30 per cent more milk with a 6 to 10 per cent increase in feed consumption (i.e., they are more efficient). We have been investigating the use of BST for the past five years. Cows injected do not have disease incidences that are any different from uninjected cows. The calves born from injected cows are normal, and they grow and reproduce normally. The composition of milk is not different from that from uninjected cows. There is also no difference in the BST concentration in milk between injected and uninjected cows.

So what is all the fuss about? I am not exactly sure of the reasons but suspect that dairy producers are afraid of public perception because of the word "hormone." Between the recent dioxane scare in B.C. and the relatively recent press on Mr. Ben Johnson, everyone is nervous about milk's image. The fact that the BST level in milk is not changed, that BST is not even an active hormone in any other species than the bovine, that BST is a protein (hormone) and is digested when taken orally (which is why we must inject rather than feed it to cows) is a very different product from the Ben Johnson story. The fact that pasteurization destroys BST anyway (in milk from injected or uninjected cows) does not seem to allay the fears some people have. It appears that the attitude of some people is "don't confuse me with the facts - I have made up my mind."

Some of the statements in the press are outright lies and some are totally out of context. I guess I will always remain suspect of what I read because of this. Other farmers are afraid of BST because they feel that it will cause them to re-think their strategy of herd management, milk markets, milk supply, and quota. Since only well managed herds will respond to BST and very few will see the 30 per cent increase that research herds have seen, and since not all of these herds will use BST nor will it be profitable for all herds, I doubt that BST will have a much larger impact than any other tool available to farmers now. As with any other tool, farmers must re-think their strategy of management if they choose to use it.

BST is not, however, all roses. We are finding that reproduction management of cows must change if BST is injected before cows are pregnant. However, this is a managerial, not health, problem that all high-producing herds face. A marker to indicate that cows were injected must be identified so that sire-proofs and official records can reflect BST use.

What is needed is a public information campaign to present the facts to those interested and not allow yellow journalism and irrational thoughts to rule the day. Researchers are more than willing to discuss both the positive and negative aspects of BST. However, we must have a receptive, unbiased audience so that we can be informative rather than defensive. As an example, I applaud the Quebec producers who have requested researchers, Health and Welfare Canada, and pharmaceutical company personnel to address them on the issue of BST. This is the only province that has taken positive steps in trying to understand the implications of BST.



Country Canada visits Macdonald Farm: Professor Elliot Block of the Department of Animal Science, second from left, with his technician Jose Carreno, is interviwed by Sandy Cushon for CBC's weekly television program Country Canada.

Off Campus

DR. DONALD L. CRAIG, BSc(Agr)'47, of Kentville, N.S.,was inducted into the Atlantic Agricultural Hall of Fame on October 12, 1988, at the Nova Scotia Agricultural Hall of Fame in Truro. Dr. Craig was recognized for his contribution to the development of the horticultural and ornamental crop industries. During his 35 years as a Research Scientist with Agriculture Canada, Dr. Craig is credited with the development of eight strawberry, two raspberry, nine rhododendron, and three azalea varieties as well as tissue culture technology. His development of virus free strawberry plants led to the establishment of a certified strawberry plant nursery program in Nova Scotia which has become an industry producing some 16 million plants each year for domestic and export markets.

ROSS CARSON, Dip'50, has been awarded the Master Breeder's Shield from the Holstein Association of Canada. Ross is now retired with son Norman, Dip'78, taking over the farm.

G. IAN PRITCHARD, BSc(Agr)'52, has retired from his position as Research Manager with the Department of Fisheries and Oceans in Ottawa and is now Director of the newly established Mountain Aquaculture Research Center, Western Carolina University, Cullowhee, North Carolina.

Two familiar stetsons! One black, one green. Under the black Marc Côté of CBC's Radio Noon. Under the green - who else but the Honourable Eugene Whelan former Minister of Agriculture for over 10 years and guest speaker at the annual meeting of the Quebec Farmers' Association held at Macdonald College last November.

Ottawa Valley livestock producer Colin McNamara, right, congratulates Eugene Whelan on his rousing speech which was warmly appreciated by the audience. QFA President Warren Grapes waits to present Mr. Whelan with a QFA pin.

ANNA HOBBS, BSc(HEc)'58, has been appointed Associate Editor of *Canadian Living*. She is also the Fashion/Beauty/Crafts editor.

GAETAN LUSSIER, MSc(Agr)'65, DSc'79, a former deputy agricultural minister for both the Quebec Ministry and Canada Agriculture, and more recently federal deputy minister of Employment and Immigration, is now in Toronto with the Weston Group.

It has been great to get news from RANDY MELTZER, BSc(FSc)'77, a native of Montreal, now working in Ottawa. After completing an internship at the Royal Victoria Hospital in Montreal, she decided to pursue a career in the Hospitality Industry. A job as Food and Beverage Controller for the Chateau Laurier Hotel in Ottawa enabled Randy to apply her skills (acquired during her internship) in recipe standardization and cost control while learning all about commercial food and beverage management. Randy was soon lured to Canada's Wonderland (a theme park located north of Toronto) where she helped set up 35 fast food restaurants, hired and trained staff and was responsible for a $5 million operating budget. After a brief stint at Beaver Foods in the Nutricare division, Randy realized that further advancement could only be achieved with a strong marketing background.

In 1984 she joined the Canadian Egg Marketing Agency as Foodservice Coordinator and Nutritionist. This position allowed her to develop marketing skills on an industrial level (i.e., to the food service industry), while becoming knowledgeable about egg nutrition. This was the first time the Canadian Egg Marketing Agency had ever hired a staff nutritionist. Some of the varied responsibilities include: acting as a resource to health professionals, providing technical advice on consumer advertising campaigns, monitoring and responding to government initatives toward nutrition and promoting nutrition through public relations programs.

JEAN FORCIONE, Dip'85, is now employed at Burroughs Wellcome in Kirkland starting as a packaging supervisor of pharmaceuticals.

HELENE GADOURY, BSc(Agr),'85, MSc(Agr)'88, and ERIC OUELLETTE, BSc(Agr)'85, MSc(Agr Eng)'88, were married on December 31, 1988, and are now living in Waterloo, Ont., where Eric is employed.

We deeply regret the mistake in reporting the death of Donald Gordon Trenholm which was totally without foundation. We apologize to Mr. Trenholm and his family and friends and deeply regret such a serious mistake.

Deceased

ARTHUR G. LELACHEUR, BSc (Agr)'47, of Sackville, N.B., on January 25, 1988.

In Honour of Helen Siminovitch

In 1988 Dr. David Siminovitch of Ottawa, Ontario, sent in a donation of $1,000 to the Alma Mater Fund of Macdonald College in honour of his late wife Helen Elizabeth (Daubney) Siminovitch who died in Ottawa on April 9, 1986. This most generous donation in his wife's memory is most appreciated and will be used to assist the college in its recruiting efforts.

Helen Daubney, who was born in Ottawa, received her BSc(HEc) at Acadia University in 1943 and came to Macdonald College that year as a lecturer in Textiles and Clothing in the School of Household Science. She also studied for an MSc degree in Agricultural Chemistry which was awarded in 1946. After her marriage to David Siminovitch she worked in adult education in Minnesota. They had three children: David, Jane, and Michael.

Although Dr. Siminovitch is a graduate from the downtown campus of McGill University, BSc'36,MSc'37,PhD'39, he had occasion to visit the Macdonald campus over the years. He recalls spending time at Macdonald doing research on penicillin and taking courses given by Professor J. Coulson of Plant Pathology. Later, in his most distinguished career, he was invited to give three lectures at Macdonald. He remembers Dr. Howard Steppler attending at least one of them. Dr. Siminovitch's early research in cryobiology laid the foundation for modern research in the field, and in 1987 he was one of the first to be recognized by the Society for Cryobiology for a career of distinction in the cryobiological sciences. Dr. Siminovitch pioneered the application of biochemistry to the study and understanding of freezing injury and freezing tolerance in plants. During World War II he worked on the development of the first of the "miracle drugs," penicillin. In 1950 he went to the Agriculture Canada Central Experimental Farm in Ottawa, where he remained for the rest of his career as head of the cold hardiness section.

Keeping in Touch

A Major Influence

My Association with the Macdonald campus goes back a number of years since I attended kindergarten in Stewart Hall and spent my high school years at Mac High. The campus truly has become a "home" for me and while the recent infrastructural changes have altered the exterior face of the campus, I continue to feel the original vibrant nature of the college whenever I return.

Your publication continually keeps me up to date on the college and on the changes in technology within the agricultural domain. I appreciate the effort that you and the contributors offer to your readers and congratulate you on being one of the major influences in retaining the Macdonald alumni as a cohesive group.

Rick Walter
Class President Agr '76
Ottawa, Ont.

From Cover to Cover

I enjoy the Journal from cover to cover. The international flavour is particularly interesting, and I like to know that other countries are benefiting from what is being taught at Mac.

I enjoy Fun Fact Fable Fiction - some of the jokes are as welcome as old friends, and some are quite new to me. I particularly enjoyed Linguistic Modesty (August'88) as, being of British stock, I have resisted the Americanization of our English language. I find at times that I have to give in. We now prepare (dress) the roast (joint) on the counter (dresser). I also read with interest Seeking Solutions by Dr. Stewart, the Diploma Corner, and Keeping in Touch. The QWI pages are not always the first and never the only pages.

Keep up the good work - the Journal is a magazine to be proud of.

Diane Bailey,
West Island WI.,
Dorval, Que.

A Keen Reader

As a Mac graduate in Agriculture Class of '31 and married for the last 55 years to Dorothy Aird, BHS'32, I am a keen reader of The Macdonald Journal. I studied at Mac for four years to get my degree and then worked under Dr. Crampton for another four years so I knew the campus well.

I enjoy reading the magazine even if I hardly hear of anyone as far back as '31. Keep up the good work on a fine Journal.

Thompson B. Cooper, BSA'31
Ormstown, Que.

Greetings from Côté d'Ivoire

Dr. Eugene R. Terry, BSc(Agr)'64, MSc(Agr)'66, currently Director General of the West Africa Rice Development Association (WARDA), sends his greetings to all members of the Class of '64 and would be pleased to receive correspondence from Macdonald alumni who may be interested in the work of WARDA. The objectives and scope of WARDA's program are briefly described on pages 12 and 13 of the August 1988 issue of The Macdonald Journal. WARDA's address is: 01 BP 2551, Bouaké, Côté d'Ivoire.

Exotic Places!

I do like the "new" Journal and read almost everything. As I love to travel I especially like reading of staff and graduates working in foreign and maybe "exotic" places.

Norma E. Holmes
Stanstead, Que.

Our Grad Student!

Just a note to let you know of a small correction from the August issue of the Journal. Martine Barbeau, BSc(Agr)'88, is now a grad student in our department - she did not go to another university.

By the way, that was a great issue of the Macdonald Journal!

Garth Coffin,
Chairman, Department of Agricultural Economics

Wrong Initials

In "Profile: Elizabeth Hamilton, New CDA President" (August '88 Journal) we regret that we have Elizabeth married to the wrong Robert Hamilton. She married Dr. Robert D. Hamilton, BSc(Agr)'59. Our apologies for the error.

Not an MBA

Pierre-Yves Gasser received a Masters in Agriculture not an MBA as was reported a the last Newsmakers section of the Journal. Pierre said he enjoyed the agribusiness management course which took three semesters plus a work term.

A Gift Subscription

I would like to send a gift subscription to my sister for her birthday. I enjoy your magazine and I am sure she will, too.

Jane A.L. Greig
Dunham, Que.

From Cover to Cover

As a McGill Science grad I was always rather vague about Macdonald apart from knowing that it trained teachers, dietitians, and farmers and, when I was in college, housed the married vets and their families.

Since I've been a WI member and received the Journal I have been most interested in reading about what goes on out there. I was particularly interested in the article on the Biopesticides Research Laboratory as I have always gardened organically, something I learned as a child from my father.

I would like to take advantage of your offer of a copy of the Macdonald 2000 report. Believe me I will read it with the same interest as I read the Journal - from cover to cover!

Audrey H. Wilson
Lachine, Que.

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